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ABSTRACT

In addition to annotated bibliographic references to 489 current United States and foreign publications on science (including technology and engineering) policy, three articles are included in this issue of this quarterly publication (see SE 011 182 for abstract of earlier issue). The first article argues that technological research and development need to increase to "cure today's ills and to safeguard the future of mankind." The second reprints, with commentary by an authority on Soviet politics in science and technology, a translated summary of recommendations on science policy made by the Hungarian Communist Party in 1969. The last is a report of a wide ranging informal interview with the Presidential science adviser concerning many aspects of federal science policy. (Author/AL)

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Science Policy Reviews is intended for individuals and organizations engaged in studying, formulating, or implementing public policy relating to science and its applications. The literature reported in the Reviews includes books, reports, and periodical articles. The regularly screened periodicals are listed on the inside back cover. The focus of the literature reported is on matters of broad public policy; literature of a highly technical and narrowly specialized nature is not included.

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About This Issue

Rather than talk specifically "about this issue", the second of the new *Reviews*, I wish to take editorial license and comment on the *Reviews* in general.

Frankly, I was pleased with our first issue of the *Reviews*. I felt that we were moving in a direction that was appropriate. I feel even better now that I've heard from some of our readers. Although I have written to each of you who has commented about the *Reviews*, I thought all of our readers might be interested to know that the bulk of the responses to our changed format have been favorable.

More important than the favorable comments about the *Reviews*, however, is the fact that we have also received a number of helpful suggestions. Additionally, we have gained a volunteer in England. Dr. Peter J. Smith of The Open University has expressed his willingness to assist us in expanding the scope of our coverage by scanning a number of British periodicals. His input will obviously enhance our coverage, and his efforts are most appreciated.

I recently examined the distribution of the *Reviews*. I was pleasantly surprised, and perhaps you will be, to know that we have recipients in over 39 countries of the world in addition to the United States. Numbered among our overseas recipients are 41 libraries. In the U.S., the *Reviews* is among the holdings of some 165 libraries./CRT

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Halt Technological Advancement ?

No! say most authorities. Readily admitting that many of society's problems stem from our whirlwind technological progress, they argue that we need more *R&D, not less, to cure today's ills and to safeguard the future of mankind.*

A particularly thought-provoking exposition of this philosophy is presented by Dr. Sherwood L. Fawcett, president of Battelle Memorial Institute, in The President's Report and Annual Review: 1970. *His words, reproduced below, offer some fascinating ideas about the directions in which science and research ought to be heading.*

Selected utterances on the same subject, lifted from recent speeches and papers by other prominent administrators, are included. All but the last one (Siekevitz) see the intelligent application of yet more science as the implement for jolting Spaceship Earth off its collision course with disaster. Siekevitz suggests that perhaps a moratorium should be declared on all technological advancement "to give political methods [for curing existing problems created by technology] a chance to work".

S. L. Fawcett

President, Battelle Memorial Institute

"In other times, I would be happy to observe convention and confine my remarks here to Battelle Memorial Institute's accomplishments, its problems, and its prospects. To do so this year, however, would, I believe, be to ignore one of the overriding challenges to contemporary society. That challenge is the need for a new perspective and sense of purpose for scientific research. The challenge is to all thinking people, but particularly to those involved in research – the pure scientist, the applied scientist, the technologist, and the engineer. Perhaps, at this time, the most urgent demand is upon scientists dealing with the unknown and generating new knowledge, but we must recognize that man's progress depends upon a balanced effort resulting in both new knowledge and innovative uses of this knowledge.

"It is no secret to observers of the world scene that science, in its broadest sense, has fallen into disrepute in many quarters. Its critics blame science for most of today's ills, including pollution of all kinds, overpopulation, crime, technologically displaced persons, and the destructive power of war. Many of them feel scientists waste the world's resources and contribute little to the solution of the problems of man. Still others insist that we have too much science – that scientists should stop and wait for the world to catch up.

"Government budgets for scientific research have been cut or at least held level. Many highly qualified scientists and engineers are unemployed. Enrollment in technical curricula is down. Congress is taking a show-me attitude, and industry is cutting its research effort. Suddenly, the heroes of the 50's have become the 'bad guys' of the 70's. On college campuses professors of the humanities are inclined to smile over the comeuppance being dealt their colleagues in science – and perhaps with some reason.

"The response of scientists or the scientific leadership to this situation has been to flee in disarray. Scientists, as a group, are not noted for their effectiveness in explaining the social value of their work, so governments and the public have been more awestruck than enlightened. All too often there has been a lack of dialogue. The scientists have merely said, 'give us money and leave us alone' and the public, with simple faith, has anted up whatever was required. The scientists never needed to explain their actions – even to themselves – except esoterically and in the vaguest of terms. Not having had to really justify their actions, they have not learned how. To this day, questions concerning the present or future relevance of what the scientists have done or wish to do are likely to be met either with a wounded look, a dissertation on why scientists must be free, or the rhetorical question, 'What is the use of a new-born babe?'

"As a result, many scientists have developed a certain ambivalence. They vacillate between the sophisticated 'don't bother me' attitude and a painful soul searching and an uneasy feeling that perhaps everything they have been doing is wrong.

"The literature is full of articles, speeches, and testimony that run the gamut – from 'Science is great, we need more' to 'let's hold back and not compound our problems'.

"My response to this line of discussion and both of these points of view is a loud, 'Hold it!' The world doesn't need less science; it needs more – much, much more. This I say not out of pride because of my involvement with science but with a blunt pragmatic feeling for the future of the human race. The scientific leadership should be the first to admit that some of the current troubles of mankind result from what we do not know and what we have not done. In a sense, we are ignorant, because there is so very much concerning this wonderful, mysterious universe that we don't understand and we are not yet smart enough to properly marshal our thinking to gain the knowledge and synthesize optimum solutions.

"Let me illustrate by a few examples.

1. We are concerned over oil spills, tanker accidents, the ecological effect of a pipeline, and we propose all kinds of studies or efforts to alleviate the situation – but we overlook the simple, deplorable fact that we are still carrying our energy around as a liquid in a bucket. We don't know any better way to move it, and we don't know any better way to transform oil into usable energy, where we need it, than to burn it. Our technologists and engineers have optimized the existing knowledge of the

situation to a fare-thee-well, but scientifically is not this process still back in the caveman days?

2. Our major means of ground transportation is the automobile and the diesel train. These devices utilize the internal-combustion engine. The materials, the design, and the method of manufacture of these engines are superb – but in terms of new knowledge of heat engines, how far have we really progressed beyond the days of James Watt and his steam engine?
3. Still in the transportation area, we move ourselves and material cargo around by vehicles with wheels. These carts perform a useful task, albeit inefficiently, but in physical principle are they any more sophisticated than the basic wheel?
4. The civilized world has made great use of chemistry, the oldest of sciences, but after thousands of years the preponderance of useful chemical processes are still based on heat from fire and oxygen from the air – pressures, atmospheres, and energy concepts close to those available in natural conditions. We have only begun to explore chemical processes at very low or very high temperatures and at high energy rates or other nonnatural conditions. From the purely scientific viewpoint, would primitive man be surprised at our most sophisticated chemical plants?
5. Biology and other life sciences prompt similar questions. We have learned to improve on the long selective processes of nature, but we are still using natural life forms. Totally new life forms for wood (structures), grains (food), and herbs (medicines) are yet to come.
6. There is so much we need to learn to use energy efficiently. For 100 years, the usual sequence has been chemical fuel to heat, to mechanical energy, to electric generation. Then, along came nuclear fission and fusion. Scientists and technologists did a monumental job of making a bomb – the easiest thing to do – and the scientists studied the principles of fission and fusion. However, except for a very few miniscule efforts, it would appear that the scientists handed the fission process over to the engineers and technologists as a heat process, dismissing an equally important consideration. Fission energy and fusion energy are born as electricity – charged particles with the high kinetic energy – and should remain so for efficient use!

"Our engineers and technologists have fine-tuned the heat-mechanical-electrical energy circuit, but it is not their job to worry about a new circuit. Now the balance of responsibility shifts to the scientists to provide new knowledge.

"A part of this sequence of events in energy use is the thermodynamic Carnot cycle. Scientists, since the time of Carnot, have seemingly accepted his analysis of thermodynamic heat cycles as true and absolute. But that is an equilibrium system. Most systems in nature, including man himself, are nonequilbrium systems. One wonders why the scientists were so quick to place the subject of thermodynamic heat cycles in the "finished" category after Carnot. Fortunately, there have been some recent signs of a renaissance in this field, the most notable sign being in the development of lasers.

"Research, for example, is in progress at Battelle in the area of laser-generated plasmas. This activity shows promise for providing a basis for fusion power via nonequilibrium laser-plasma interactions. The Battelle effort is modest; yet it is not overshadowed by the efforts of any other laboratory in the United States.

"In summary, a review of the contributions of fundamental science to new knowledge over the past quarter century toward a better way of life leads to several conclusions:

- With respect to processing of intelligence and knowledge and the transmission of information between people, the contribution has been substantial, but much remains to be done.
- In the development of optimum materials for man's use, the performance has been satisfactory – occasionally even spectacular.
- The development of new knowledge about the transportation of human beings and cargo has been disappointing.
- The development of new knowledge on the generation, transmission, and final utilization of energy has been inadequate and seemingly devoid of imagination.

"I do not mean to demean any single contribution. Some contributions have been truly monumental; however, as a group of thinking people our performance in pure scientific endeavor is indeed spotty.

"If my judgment of science's past performance seems harsh, it is because I have such high hopes for its future value to mankind, and it may not be as difficult to reach those heights as some might suppose. We need a new perspective on science, and we need a new sense of purpose. We need these much more than we need large new appropriations for research, new institutional forms, or new legislation. Indeed, we can well proceed on the assumption that there will probably be no substantial increase in funds for pure scientific research, nor should there be.

"As a beginning, we need a reordering of our priorities. We need, as I have tried to do here, to stand back and take a larger look at how modern man lives and what is important to his health and well-being. We need to ask fundamental questions concerning man and his future – 10, 100, and 1,000 years hence – and, looking ahead, we should be acquiring a new knowledge to sustain him. Then, we – individuals and institutions – need to reorient our effort accordingly.

"The results of such a fundamental reappraisal and reorientation could be far-reaching:

- Scientists could begin to direct their effort toward "new science" that would be more applicable to man's needs.
- Leaders in government, industry, and education would see more clearly the relationship between fundamental science and social goals.

- Government policy would reflect a new determination and care in using the talents of scientists for the greatest human good.
- Finally, there would be a stronger awareness among people generally of the impact of science and technology on human endeavor. In this regard, I foresee the emergence of a new breed of scientist-journalist who will be a critic as well as an interpreter. These people will not only "translate" science's success stories into layman language but will help shape public thinking and values with respect to science because of their own training in and knowledge of science.

"This, then, is the challenge for scientific research – to generate new knowledge in a way that it can be used by engineers and technologists in providing a better world for man. The challenge is very great, and scientists must be the first to recognize its implications. For some, it will mean giving up sacrosanct ideas concerned with the freedom of the scientists to work in comfortable isolation. For all of us concerned with scientific research, it will require a very honest appraisal of what we have done, why we have done it, and what we should be doing. The challenge demands of us the courage to speak out to leaders in industry, government, and science itself; and, equally, the patience to listen carefully to them. We must take a new initiative in interpreting our work and our aspirations for all men.

"Despite the temper of the times, the need for new knowledge has never been greater. Fundamental scientific research is absolutely necessary to the existence and advancement of mankind. The problem of bridging the gap between fundamental research and the utilization of science is a difficult one, but that, too, is part of the challenge. It is a challenge we at Battelle accept and welcome."

H. E. Carter

Chairman, National Science Board, National Science

"To a certain extent, science and technology are responsible for our present difficulties, but in a broader perspective it has been the inadequacies rather than the accomplishments that have resulted in the problems we are facing today. We need more science and technology, not less."

E. E. David, Jr.

Science Adviser to President Nixon

"... Perfect solutions [to today's problems] are unlikely to be found. Rather, society will have opportunities to create totally new situations in which today's problems will be less important. However, this will come to pass only if we have a cadre of quality researchers producing new possibilities which are not widely foreseen. Thus, though I sympathize with relevance in research, I think it can be carried too far. . .

"The Congress and the public . . . must encourage work toward new possibilities . . . [research having] the generality to produce the unexpected and the *tour-de-force*. We need work . . . which lays down a landmark of accomplishment on which future accomplishment can be built."

A. J. Eggers, Jr.

Assistant Administrator for Policy,
National Aeronautics and Space Administration

This writer points out that survival demands an equilibrium on Spaceship Earth, so that population should be levelling off. "Technology from Earth-based to space-based", he says, "must play a massive role in this evolution [toward equilibrium] because it will be crucial to effective Earth-resources management and distribution and keeping us compatible with Earth's environment. Accordingly, substantially more attention will be required to the general Carnot-cycle efficiency of the engines of society in relation to this environment, and what is now more nearly a novelty of utilizing waste heat and material for useful purposes will become more nearly a necessity. Thus, in the future entropy may well be monitored as closely as inflation is today."

P. Handler

President, National Academy of Sciences

"If the Congress shares my conviction that, for all of our difficulties, science is, nevertheless, the principal tool that our civilization has fashioned to alleviate the brute condition of man . . ., then you will agree that our future course should not be a reversion to a more primitive era but rather the utilization of yet more technology so as to assure the benefits of our civilization to all of our people while establishing a safe, stable equilibrium with the environment and with the resources of this planet, utilizing our technological capacity to assure the national security and improve the public health and welfare."

W. D. Mc Elroy

Director, National Science Foundation

"Simply put, civilized man cannot survive many generations without the increased creation of new knowledge and its enlightened use."

J. Platt

Director of Mental Health Research Institute, University of Michigan

"I think [mounting crisis problems] will require something very similar to the mobilization of scientists for solving crisis problems in wartime. I believe we are going to need large numbers of scientists forming something like research teams or task forces for social research and development. We need full-time interdisciplinary teams combining men of different specialties, natural scientists, social scientists, doctors, engineers, teachers, lawyers and many other trained and inventive minds, who can put together our stores of knowledge and powerful new ideas into improved technical methods, organizational designs, or "social inventions" that have a chance of being adopted soon enough and widely enough to be effective. Even a great mobilization of scientists may not be enough . . . But for problems of this scale and urgency, this kind of focusing of our brains and knowledge may be the only chance we have."

G.T. Seaborg

Chairman, U.S. Atomic Energy Commission, and
President, American Association for the Advancement of Science.

"It is essential that we advance science if we wish to advance man . . . The frontiers are still endless."

Scientists must counteract the "dangerous" pervasive "anti-science, anti-technology, and anti-rational" feelings, "because every major problem we face today — whether environmental, educational, social, or political — has important ramifications and somehow involve scientific and technological judgements or require more and better knowledge that can only be achieved through scientific investigation."

A.M. Weinberg

Director, Oak Ridge National Laboratory

"The job and purpose of science and technology remain overwhelming: to create a more livable world, to restore man to a state of balance with his environment, to resolve the remaining elementary and primitive suffering of man — hunger, disease, poverty, and war . . . It is up to us, members of the older scientific-technological establishment, to persuade our younger impatient scientific nihilists that ours is the course of reason, and that in our arduously built scientific-technological tradition lies our best chance of ultimate survival."

J.B. Wiesner

Provost of M.I.T. and former presidential science adviser

"Regardless of the current mood and attitudes, progress toward a decent society in the future continues to depend upon a strong scientific program and its related educational activities, and so we must seek to remedy the present situation . . . We need a recommitment to an aggressive, vital scientific program, a rededication motivated by the true need of our society, the need to be continuously inventing our future, if we are to remain a vital nation."

P. Siekevitz

Professor of Biochemistry, The Rockefeller University

"As an extreme, I would suggest further that technology has badly outraced the political and social means of handling the problems it generates, that research and development are so intertwined that the former leads invariably to the latter, and that, to give political methods a chance to work, or to devise new political methods, technological advance, and thus research, should stop . . .

"The idea of directed research has often been broached, though with the objective not of building a more natural habitat for humans but of undoing the damage caused by previous technology. Perhaps the most far-reaching of these proposals are those of Platt [*Science*, 166: 1115 (1969)] and Weinberg [*Science*, 167: 141 (1970)]. What they all say in effect is that the ills of technology can be cured by more research and technology, the technology being directed towards commonly approved goals. The most ludicrous of these proposals is that of Roberts [*Science*, 167: 11 (1970)], who suggests that space technology should be redirected towards terrestrial goals, when his goals turn out to be only more efficient ways of ravishing the Earth.

"I would thus suggest that the present environmental mess is caused by rapid technological growth, driven on by haphazard research, during the past thirty years; that this research and development are inexorably linked; and that, in spite of this research, we scientists have only little understanding of the natural world around us. Given these beliefs, it seems to me to be disastrous to think that further refined technology, directed though it may be, will cure past technological mistakes. So is it to be the ultimate responsibility of scientists to society that they discontinue their existence as research scientists?"

SCIENCE POLICY, COMMUNIST STYLE – NEW INSIGHTS

An article on science policy in Hungary, published in the March 1971 issue of **Science Policy News***, *is noteworthy for several reasons: (1) it summarizes a final report containing science policy recommendations made by a ruling Party in a Soviet-bloc country, of a type that rarely reaches the West; (2) it reveals a sincere effort, involving 18 months of study and debate by many Hungarian Party leaders, research administrators, and scientists to deal with some serious obstacles to Party-scientist cooperation, reported with refreshing frankness; (3) it suggests important concessions by the Party leaders, made in what appears to be a genuine effort to stimulate the Hungarian scientists to keep pace with international science.*

Dr. Louis Nemzer, Professor of Political Science at The Ohio State University and an outstanding authority on Soviet politics in science and technology, has agreed to comment on the Hungarian report for **Science Policy Reviews.** *The Hungarian report summary is quoted below, interspersed with Dr. Nemzer's comments (in italics).*

HUNGARY: Scientific Freedom, The Social Sciences, and Science Policy

Dr. Nemzer: *The Hungarian Socialist Republic has the reputation, in spite of its sad history in 1956 (when the Soviets intervened in a period of liberalization to reimpose their own approved rulers), of having become one of the most experimental of the East European countries in recent years. Much that is debated privately in other Soviet-bloc countries is said with relative frankness in Hungary, and this sometimes leads to important changes. Hungary has been one of the leaders in economic change, and this report suggests an eagerness to clarify policy in scientific matters that may also lead the way for the Soviet bloc.*

This account gives only a brief insight into a much longer report, but it deals with some basic

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problems. Apparently, the Hungarian Communist leaders have decided to impose their own "specialized administration" on the Academy of Sciences and to set key policies for the latter, and thus are trying to do simultaneously four things: (1) assure the scientists and technicians that they will have some power to advise and report on basic policy, and that they will have extensive freedom to do R&D in both the social and natural sciences; (2) assure the Party conservatives that these rights and freedoms will not be abused and that granting them is imperative; (3) assure all Hungarians that the errors made by the Soviet political leaders will not be repeated; and (4) assure the Soviets that the Hungarian leaders are still loyal Marxists in the Soviet camp.

Baltic Sea
East Germany
Poland
U.S.S.R.
Czechoslovakia
Austria
Hungary
Rumania
Yugoslavia
Adriatic Sea
Black Sea
Bulgaria
Albania

"The Central Committee of the Hungarian Socialist Worl Party decided on 23 November, 1967, to survey the problems of science policy and the control and guidance of scientific research in Hungary, to draw up a report and make proposals for improvement. We give here the résumé of the Report delivered at the Meeting of the Central Committee, Hungarian Socialist Workers' Party, 26 June, 1969, by György Aczél, Secretary of the Central Committee of the Party."

Unquestionably, this is a major statement which carries the Party's approval and has become the basis for significant action in the field of science. The report was delivered by Aczél, one of the four executives (Secretaries) of the Hungarian Communist movement, and a man who has risen to power only in recent years. He presented the report to the Central Committee of the Party, in the name of the Party leadership, and it was presumably accepted forthwith.

"Increasing the effectiveness of scientific research and of technical development are essential prerequisites for the intensive growth of our national economy. The requirements of socialist construction would certainly have directed our attention to these problems; this process has merely been accelerated by the demands and possibilities raised by the reform of the economic mechanism, the new system of economic management which stimulated the clear formulation of our scientific policy.

"In the report prepared for the Central Committee we are not proposing a radical change in our scientific policy, only its improvement."

Here we see the first of a number of "double bows", where an idea is presented that appears revisionist, and is soon followed by one that seems to support the traditional Party line. In this case, the need for reforms in science are tied to the accomplished economic reforms; while the countering statement is made that even without these, "the requirements of socialist construction" would have dictated the need.

It is noteworthy that, as N. Leites and others have pointed out, Soviet Communists are very apt to deny that radical changes are needed, and to bring about real changes while verbally stressing continuity.

"In the first phase of the preparation of the report – a survey and analysis of the situation – there were seven working committees, and in the second phase – elaborating detailed proposals – there were eight, involving the co-operation of approximately 200 scientists, researchers, research organisers and Government and Party leaders."

It is not unusual for bloc governments to have specialists work with Party leaders in preparing special reports. However, an unusually intensive effort is implied by the use of 200 people, most of whom must have been technical, on the seven working committees studying records to uncover problems in the survey stage, and eight working committees elaborating detailed proposals for final consideration.

"Today, we have to accept the existence of a given scientific basis. Drastic reorganisations do not benefit research and scientific pursuits. Consequently, we plan to modify the proportions, to alter the general structures gradually as needed. It seems to us that not only rational material reasons justify the increase of the proportion of university research within the entire framework. Joint research teams drawn from the universities and research institutions should be set up.

"In addition to our own favourable experiences with industrial research, there are international examples to encourage the accelerated expansion of research-development sections in industry. We find that wherever research, planning and production make up an integrated whole, there is less trouble with the practical application of research results, and it takes much less time to enable scientific achievements to become embodied in products and material benefits."

Note again the pretense of a strong stand against radical change – the need to minimize interference with the existing "scientific basis" and to make indicated changes gradually. Changes recommended (stepped-up R&D by universities and industry) are based partly on successful experiences abroad (the West and the Soviet Union). However, the reference to treating research, planning, and production as "an integrated whole" is a clear bow to the Soviet practice.

"In the discussions preceding the present meeting of the Central Committee, there were sharply differing views on the place, function, organisation and future of the Hungarian Academy of Sciences. There were even proposals that the direction of the research institutes now functioning under the Academy should be taken over by the competent ministeries, or the Ministry of Education, and that the Academy should become a kind of intellectual centre without research organisations of its own, such as the French Academy.

"Our proposals suggest the separation of the scientific bodies and the tasks of specialised administration. The majority of those who contributed to the discussion approve of our proposals. Their agreement expresses the wish that the scientific bodies should be concerned with the advisory task of submitting proposals and giving expert opinions. The specialised administration should provide for the direction, with governmental responsibility, of the Academy. Also justified is the demand that the democratic right of control and criticism over the specialised administration be ensured for the scientific bodies."

> *The expression "sharply differing views" suggests that heated debate occurred and that the Party was willing to weigh the arguments of the scientists and administrators, tacitly admitting that the decisions are not clear-cut. The reference to majority approval (unusual in itself) indicates that the Party's decisions were finally acceptable to most of the technical participants, although this is definitely not a requirement.*
>
> *The wording regarding what was finally agreed upon is confusing. It appears that the "scientific bodies" (presumably the basic and applied research groups within the Academy) are to have the privilege of submitting research proposals and advice to the "specialized administration" (which appears to have the task of setting policy for the scientific bodies in accordance with the Government's wishes). Granting "the democratic right of control and criticism" (as the Soviets use these phrases) to the scientific bodies is not likely to mean that the scientific community can dictate policy to the specialized administration. As in the Soviet Union, it probably merely gives the researchers the privilege of asking for explanations, and of pointing out inconsistencies with announced policy.*

"Our scientific outlook is based on the unity of the material world. Consequently, we disagree with the views which would erect a Chinese wall between the natural sciences and the social sciences, or, in other words, between the 'non-ideological' and the 'ideological' sciences.

"The drawing of hard lines between the individual branches of science and between the natural and social sciences is wrong not only as a matter of principle and of ideology, but also because it is detrimental to the advancement of science. It is commonly known that the rigid walls of partition between the individual branches of science are collapsing; in fact, the sciences show their most rapid development in these borderline areas, where the largest number of new scientific results are born.

"For this reason, scientific administration should also stimulate the interaction of the sciences, encourage interrelations between the individual fields of science. Provisions should be made that the researchers and appliers of the individual branches of science should maintain regular contact with each other, that they should understand each other's idiom, problems, and aims. At the same time, the changing world of science and the differentiation and integration taking place within it, the need for the theoretical generalisation of the new phenomena discovered in nature and society, also act to increase the significance of philosophical research: for an ever wider and more complex accumulation of knowledge must be inventoried, systematised and synthetised.

"Having stated the foregoing, one should also point out that the vulgarising views which attempted to apply the arguments and methods of Marxism-Leninism mechanically in research, served neither the spread of Marxism-Leninism nor the advancement of the sciences.

"The attitude is definitely wrong that through his mastery of the laws of dialectics, a scientific worker has automatically acquired a recipe which in itself helps him to treat cancer more effectively, or to develop more serviceable alloys. Similarly wrong was the view which qualified entire branches of science, and scientific statements summing up objective phenomena, as ideologically harmful. In this manner, cybernetics, sociology and much of psychology were put in the list of 'bourgeois sciences'."

This section contains thinly veiled allusions to the Lysenko story and a half dozen or so other cases where Party interference into science in the Soviet Union produced near-catastrophic results. It also refers to at least one case in the mid-1960's where the Party leadership was asked to take a stand on a cancer research program and, remembering the Lysenko debacle, told the scientists to settle their own differences on such technical matters. The report goes on to promise that there would be no attempt (such as has been made in the Soviet Union and other bloc countries) to separate the Party's role in the hard sciences from that in the social sciences, and that cooperation among many types of scientific and technical groups would be permitted.

Thus, on one hand, the Hungarian scientists are being told that the Communist Party would not repeat the errors made by the Soviets. On the other hand, with a "double bow", the report goes on to pledge continuing allegiance to Marxism-Leninism in general and to the Soviet Union in particular.

"It is not mere accident that the problems of the social sciences rank high in our report. There are objective reasons for the world-wide increase of the significance attached to the social sciences.

"Progressive natural scientists, also, have come to realise the significance of the social sciences because they know that mankind is able to benefit from the achievements of the scientific and technical revolutions – or avert by deliberate collective effort the dangers accruing from technical advances – only with the aid of the proper social conditions.

"Our report takes a definite stand against the pluralist conception of Marxism. This concept is a silk purse made out of a sow's ear, nonsense, just as much as it would be to speak about several laws of free fall. Just as there is only one valid truth in a given question, only one genuinely scientific ideology is possible. Marxism should not be regarded as a collection of dogmas, but a living science that is able to keep pace with the changes of the world and is able to answer the problems of our times.

"The sharpened struggle waged against dogmatism and revisionism has created new conditions for scientific work, in the first place in the field of the social sciences. Abolished is the intellectual pyramidal system which made possible the revelation of scientific truth only at the top, a system under which only the leaders could formulate truths valid for the social sciences, and the declaration of truth depended on one's function rather than on his having both his feet firmly planted on the soil of science."

Here is another "double bow". Great emphasis is placed on the need to achieve "proper social conditions" through study and discussion, rather than having scientific truth formulated by a few political leaders as the Stalinists had done in several cases. However, for the Party liners, "the pluralist concept of Marxism" is ridiculed; instead, the report contends that there is "only one valid truth" and "only one genuinely scientific ideology", and that "deliberate collective effort" is needed.

"In our opinion the relationship between the socialist state and science cannot be a business relationship even though material factors certainly play a part in it. In our pattern the relationship of state, society, and science can be correctly interpreted only if we reduce them to a common denominator: the common interests of socialist society, the socialist state and of science.

"Let us say a few words here about the relationship of scientists and politics. We are aware, of course, of the fact that it is impossible to speak of a universal model valid for everyone. There are both hydrogen-bomb-mongering Tellers and peace-championing Joliot-Curies among the scientists. But let us add immediately: even though we are incapable of statistical proof, the vast majority of real scientists must be closer to the latter than the former. This must be an obvious statement for all who consider the efforts the scientists of the world are making in the peace struggle even today. The world-wide peace movement demonstrates this just as much as the actions of the individual scientists who are taking a stand against the arms race and against imperialist policy in reference to the third world.

"Most scientists watch all social processes with great interest and with a critical exactingness worthy of their profession, and are sincerely glad to co-operate trying to remedy areas of backwardness.

"Scientific thinking – which includes free scientific discussion – is one of the strongest links between socialist politics and scientists.

"The rapid technical and technological advances taking place in the economy of the world make reliance on the ever newer scientific results imperative in our own economic life, both in the direct sphere of production, and in the spheres of activity connected with it. Unless this is done, we shall wake up one day to find that we have fallen behind in international competition, a lag not easy to make up.

"We know, however, that all principles, however correct, may cause harm if they are interpreted with narrowminded dogmatism. This is the case with scientific research, too. Social usefulness cannot always be immediately translated to economic profit. This holds in particular for basic research, whose results are usually not directly applicable but are nevertheless essential for laying the foundations for the future. Nor should it be forgotten that the path leading to a scientific success is in most cases strewn with a series of failures. For this reason exaggerated pragmatism, narrowminded expediency, impatience may cause irreparable damage.

"Among our principles of science policy we would like to place special emphasis on the need for international co-operation. If we examine the figures of statistics, we shall find that Hungary and the other socialist countries spend nearly the same proportion of their national incomes on R and D as the advanced capitalist countries. Until co-operation and division of labour are, however, a concretely accomplished fact, a number of practical barriers still have to be removed."

This section reflects the strenuous effort to improve relationships between groups in the Party and in Hungarian science, to make concessions to *each, and to ask each to improve the conditions in which Hungarian science and politics must function. There must not be too much pressure on Hungarian scientists and technologists to produce immediate material results or economic profit; thus, the scientists must be permitted to carry on their basic research without being judged with "exaggerated pragmatism, narrowminded expediency, impatience". On the other hand, the Hungarian scientists must not try to do everything independently, but must make use of the scientific work being done abroad. The Hungarian state is already spending all it can justify on R&D, and scientists are instructed to strive for "international cooperation", with priority given to the removal of "practical barriers" to even more "cooperation and division of labor". The Party conservatives, who are apparently suspicious of some scientists, are reminded that while a few scientists in the West are warmongers, the vast majority can and must be trusted. The Hungarians must therefore be given the right to carry on free scientific discussion and other forms of scientific thinking, or the nation would fall behind in the worldwide effort to make "rapid technical and technological advances", and this would be disastrous.*

"The question of the freedom of science is an important factor in our science policy. We hold the view that any problem and any hypothesis is permissible for scientific research. We deny any justification for the existence of scientific monopolies, and take measures against them politically, organisationally and by other means. Empirical experiences make us do this.

"Scientific schools, in the proper sense of the term do not, and cannot, form monopolies. The kind of scientist who creates a school does not hold back the development of his students and associates, he does not narrow down their interests to the problems only of personal concern to him, but promotes their growth by all means, supports their independent initiatives, and endeavours to correct their errors; he encourages self-confidence and promises perspective in the case of longer projects whose results may be delayed; he creates for them the objective, free platform for scientific debates. What makes him a leader, a 'master', is in the first place his own scientific research method, his peculiar manner of approaching problems, the modesty characteristic of great researchers in the face of the still unknown provinces of reality, and mistrust of easily achieved, falsely attractive pseudo-results.

"We believe that we are to concentrate our resources in the first place on problems and aims, and not individual institutions. The practice can be quoted of some of the advanced countries where often highly important scientific projects are carried out through the expedient co-ordination of several hundred places of research."

> *This is one of the more puzzling sections, and makes us wish for the full report. There seems to be implied here a situation in which some Hungarian scientists were denied permission to investigate some particular problem area or to test some hypothesis. It may have been done through a type of "scientific monopoly" which often has existed in some areas of Soviet science, where only a few men are given the necessary facilities and authorization to study a major scientific area. The report also promises that use will be made in Hungary of the Soviet practice of combining a variety of talents and facilities to carry out a single project dealing with a particular set of problems or aims (coordinated programmatic research).*

"Our report devotes serious attention to the problems of the general atmosphere of scientific life, the training and qualification of scientific personnel, the exchange of researchers, and the selection of replacement and leaders.

"Unsatisfactory is the rating of ideas, of results and failures in our scientific life: the critical spirit is not frank, bold and creative enough. The improvement of the public and critical spirit is chiefly a political responsibility.

"Our personnel policy is also affected by the changed circumstances of scientific development, the fact that the science of our times is determined not by individual achievements, or at least not in the manner as it used to be in the golden age of modern science. Of course, there are still outstanding talents, but to enable science today to create something really important, well-organised and well-directed research groups equipped with adequate facilities are needed.

"Under our conditions the relationship between science and science policy is defined by the circumstances that political leadership cannot be without the work of scientific preparation. At the same time, scientific work, and particularly social scientific work, cannot be without the knowledge of assessment of situations which can be furnished by the activities and international experiences of the Party. That is why we hold it necessary to establish closer contact between the competent Party organs and the workers of the social sciences. Some people voice their anxiety in connection with this, saying that this relationship is simply an 'alias' for holding the social sciences on

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a tighter leash. Practice will demonstrate that this is not what we want."

Here are some frank references to conditions and fears that may be hampering the Party's interaction with science, and the progress of science itself. The Communist Party will often complain that groups of specialists fail to take a principled position with reference to shortcomings, and here the Hungarian Party is finding that there is lacking a frank rating of ideas and failures in Hungarian science, and a lack of boldness in the "critical spirit". This is presumably a basis for arguing that the Party, with its self-proclaimed capacity for ensuring adequate self-criticism and providing outside "principled" guidance, has a very special contribution to make and it must therefore be fully involved in the total scientific process.

Aczél promises that some of the Party representatives will have sufficient scientific training to enable them to understand and work with the scientists. At the same time, the scientists are reminded that the Party has a special capacity for insights and synthesis (through its use of Marxism, and because of its past experience in studying and guiding societies and social groups). Consequently, its "assessments" must be made part of the total evaluation of scientific activity.

There is also a demand for more teamwork, for less dependence on individual brilliance, and for using the Party's collective approach. This is sweetened by a promise that the State will provide better facilities for "well-organized and well-directed research groups". In closing, Aczél says frankly that the scientists fear the new arrangements being proposed, believing that these may well be a cover for tight controls on the social scientists. He promises that actual practice will show that these fears are groundless.

Candid Thoughts by the President's Science Adviser*

As the science adviser to President Nixon, Dr. Edward Emil David, Jr., is one of the most influential men in the country in determining the future course of U.S. science. When Dr. David left the relative seclusion of Bell Laboratories to assume his post last September, government funding of science was decreasing and scientific morale was at a new low. There hasn't been a dramatic reversal of fortunes since then, but encouraging trends have begun to appear – particularly the Administration's request for increased science funds for fiscal 1972.

This spring, Fred H. Zerkel, head of the Washington News Bureau of Chemical & Engineering News, *won the great admiration and envy of your* SPR *editor by getting Dr. David to take time out from what must be an unbelievably busy schedule for an exclusive, informal chat, complete with candid photos. What Fred heard from Dr. David on such topics as the SST, graduate-student support, unemployment, and science-government interaction follows.*

I Am Optimistic About the Upswing in Science...

Basically, I think that the health of R&D in this country is better than its morale. Morale is a major problem. It was when I came here, and it still is. People are uncertain as to what's happening and why and, because of that, morale has dropped. I think the 1972 budget has definite directions; that has helped and will help more.

There still are places in the budget which are tight. The Atomic Energy Commission is one. Research in the AEC is particularly tight and we have to worry about that. The long-range National Aeronautics and Space Administration program is still in an undefined state. We've got to come to grips with that. And we will.

But the whole AEC has a lean budget. This means that the fabric of the AEC is stretched tight. There is nothing wrong with that. The lean approach to life is probably healthy for a while, but not forever.

There are things going on in AEC at the moment that would be worth more support in the national interest. I like the fusion work, for example, and I think it ought to be pushed harder. This is extremely interesting, significant, and very promising work.

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I am also concerned about the state of the national laboratories of AEC. They represent one of the great scientific and technological resources of the country. We are not making as full use of them as we might in all the programs of government, not only in AEC programs. A number of them are already pushing in other directions. For example, only about 40% of the Brookhaven budget is involved with high-energy physics. Much the same thing is true at Oak Ridge. The problem is not getting these laboratories involved in new fields; it's finding out how to couple them to other fields in a way that doesn't at the same time divert them from their AEC mission.

There are numerous other areas which need to be looked at carefully and where planning needs to be done. These, in general, are the health care R&D areas – how to use technology to improve health care. There is work of this kind going on, but I don't feel comfortable with the program as a whole. I'm not saying it is either too big or too small. I'm just saying that I don't feel comfortable with the way it is. It's spread across several different agencies: Not only is it in HEW, but in OEO, the Defense Department, and the Veterans Administration. It's all over the place. We really have to look at it on an integrated basis for balance, and we intend to do that.

The energy picture is pretty scattered at the moment. The President's reorganization is intended to consolidate a lot of that. Environmental work is still spread over at least two or more agencies.

I reject the concept of a Department of Science . . .

We will be seeing a transition in the organization of science in Government, coupled with the President's overall government reorganization. This is obviously going to have an impact on the organization of science in Government, but [the transition] may be slower in coming than the reorganization of the Government as a whole. But I do think that the organization of science in Government will change.

We're seeing the beginning already. The assumption by NSF of mission-oriented work – brought about by the Daddario bill in 1968 – is one example. In addition, if you look at the organization of the Government as the President has laid it out, it consists of functional units: Departments of Economic Development, Community Development, Natural Resources, and Human Resources.

Now each of those departments is going to have its own R&D. This will mean a fusing into those departments of R&D elements which already exist. However, I also see a number of cases in which necessary work is so speculative that an operating agency or a mission-oriented agency might not want to take it on. We must have another resource which is outside these mission agencies which can take large risks where these are commensurate with possible gains.

I would see basic research and advanced technology as a separate, on-going activity, but there would also be those activities within the mission agencies. I see a duality here.

So, I reject the concept of a Department of Science. However, any grouping that contained the NSF basic research component as well as the advanced technology component might appear superficially to be a Department of Science, but actually such a structure would contain only a very small fraction of the total federal science and technology.

Many industries don't have the R&D tradition . . .

Where private enterprise can pick up the cudgel and carry through, I am very much in favor of it. I must admit that the history of technological development in the Government for the commercial market has not been a resounding success, except in a few cases such as the AEC civilian reactor program.

On the other hand, in some cases projects are so large and the industry involved so fragmented that they are really unable to come to grips with big, expensive efforts where the risks are high and the payoff far in the future. Furthermore, many industries don't have the R&D tradition. The tradition of R&D and the peculiar culture that surrounds it are necessary for its existence and its effectiveness. Some industries have not cultivated and have never had this tradition. It's difficult and, indeed, almost impossible for them to begin R&D on a large scale successfully and without great waste of resources.

In the next few years the nation is going to be faced with many problems concerning government action in certain R&D fields. The President decides whether a development is potentially so important that if industry doesn't pick it up, then the Government must. He has made a number of those judgments, particularly in the environmental area. And we are doing a great deal of environmental research, for example, the unconventional automobile propulsion work at the National Air Pollution Control Administration. The question arises: Why should the Government be developing unconventional automobile engines — why not the industry itself? Well, there is a delicate judgment there as to whether the Government ought to be doing such work. In this instance, we had judgments from many people both in and out of the industry that if the Government augmented the work, it would go forward a great deal more rapidly. I don't see us taking over automotive R&D, however.

One interesting subject that comes up is the question of foreign trade. Many people say, although I am not prepared to vouch for it, that Japan, for example, encourages mergers in its industry to relieve the degree of fragmentation that leads to marginal industry. Marginal industry can't compete on the world market. The Japanese have been particularly successful, I think, in encouraging consolidation at the right time and to the right degree, maintaining competition but keeping it from becoming lethal to industry.

I wouldn't be surprised to see us in the long run worrying about that in terms of American industry. Of course, this is a matter which far transcends science and involves antitrust policy among other things. But it is clear that in the end you end up talking about not only the whole question of government support, but also stimulation of innovative R&D.

If we are to compete on the world market we must produce something unique or produce existing items at lower unit cost. The whole spectrum of activity related to productivity and innovation needs to be examined. In fact, the President's productivity commission is studying this.

Two or three trends are clear: First of all, the economy is service oriented – well over 50% of the workers are now performing services and are not in manufacturing or agriculture. Over half of the gross national product is derived from services. If we are really to increase productivity, we have to do it in the service sector.

We can't neglect productivity in the manufacture of goods in spite of that segment's shrinking proportion of the GNP and number of workers. Somehow the things we produce don't compete in many cases in world markets.

It is disturbing to see the Japanese manufacturing automobiles with a workmanship that surpasses the workmanship of some of our production and at lower cost. Everyone knows what happened to the camera industry of this country. We lost our camera trade to the Germans and then the Germans lost it to the Japanese. I don't want to see our industry go that way. We must encourage the manufacturing part of our industry with respect to innovation and productivity.

Students want to go where the action is . . .

One of the things we have done is to cut back on the traineeships and fellowships. We advocate supporting students largely on the basis of research assistantships and associateships and teaching assistantships. The idea here is very simple. The Government is funding research in the universities on topics which are important to the country. These will include some of the subjects I have been talking about.

It is much better to have graduate students attached through their research to these fields than it is to grant fellowships and traineeships which can leave them unattached to anything, except the current fashions in research. Students want to go where the action is and our approach will provide them with an opportunity to do so.

The National Science Foundation's program shows significant shifts in this direction. The Environment Protection Agency is going to have its own research programs, which undoubtedly will be coupled with the universities, and so on with the other agencies. So, I see just about the same level of student support as before, but by a different mechanism.

It does worry me that there is an attempt on the part of many people in the nation and the community to discourage careers in science and engineering. Even some engineers and scientists themselves do this, either through bitterness or through the fact that they are just misinformed. I deplore that. I don't think it is a good idea. It is not based on reality, because the opportunity for first rate engineering and science is going to be unexcelled in the next few decades.

There has not been a shift away from basic research . . .

The SST vote is one indication that there may be an anti-technology bias in Congress. It may have been even stronger a year or two ago. At that time, Defense Department R&D was cut sharply by the Congress.

The intent of the Mansfield amendment [which limited Pentagon spending for research to that relevant to defense] was straightforward and okay. But the effects it had were not the intended ones. It had a spinoff effect on other agencies resulting in a shift away from basic work in the face of budgetary stringencies. That was not the intent of the Mansfield amendment. I think most Congressmen and Senators would agree that every mission agency, including DOD, should do its own basic research, but that that research should not depart very far from the mission of the agency.

There has not been a general shift away from basic research in this country. There has been some pressure for short-term results, yes, but this has not been rejection of basic research. Rather it's the pressure of the needs and problems of the country.

I see this business of short-term vs. long-term research as a feeling of urgency on people's part that something needs to be done about these problems. Somehow, in this atmosphere of urgency, long-term work doesn't seem as attractive as it was to many research people. But the notion that somehow we have to show that astronomy and high-energy physics, for example, benefit society in a very direct and economic way is the wrong attitude for us to take.

Basic research gives us insights into the nature of the universe and the nature of life, adding to mankind's view of itself and so to world-wide culture. Contributions in this spirit are a vital part of the legacy of American science. The Apollo missions are such contributors, but so are quasars and quarks. These contributors of basic science are just as important, in my view, as the "practical" results which sometimes emerge.

We must justify funding by excellence of the science . . .

What we'll be doing in the budget for fiscal 1973 is hard to tell at this stage. After all, that budget is about a year away. But I am optimistic about the upswing in science and technology.

The President has said that he will ask for whatever additional funds are needed in the cancer area. So that could become a large program. On the other hand, I suspect that it is difficult to build up to a very large size really first-rate research in the cancer area extremely rapidly.

We still have the space program. And the basic decision on the future of that program has not yet been made. It is in the process of being studied. If the space shuttle program were to go forward, it would be a large increment in the NASA program. If you lump that with a space station, and then go further and lump in a Mars mission, the total is bigger than the Apollo program. But that is all very speculative at the moment.

The important thing is that the programs to be undertaken must be justified on the basis of their merits and not merely to meet some budgetary number that we happen to agree on.

I don't think we will ever convince any Administration or Congress to guarantee a continued future support of any activity, be it basic research, or health, or anything else. We might extract a commitment for a short time. But in the long run we must justify science funding on the basis of the excellence of the science. It's just that simple. I dismiss the idea of basing support for basic research on some fraction of the GNP.

There will be more people unemployed in six months . . .

In my opinion there will be more unemployed people in science and technology in six months than there are now. There will be a large number of people coming out of universities who will be on the market for jobs. The SST decision will aggravate the situation. The uncertainties in the next six to eight months are substantial and we will be doing something in that period to try to keep body and soul together, so to speak. So, the real problem, I think, is relatively short term.

We have received a number of suggestions from our employment meeting last month, but many of them require legislation. That might be so slow and uncertain that we wouldn't want to predicate our actions on the possibility. We need programs that can be done under existing laws.

In terms of the long pull, say up to 18 months, I think the answer lies in the economic strength of the country. If the economic recovery goes along the lines we expect, unemployment will straighten itself out. However, in the shorter term it is not going to straighten itself out.

The advance of knowledge cannot be suppressed . . .

I see a real danger that society will put limits on experimentation, particularly where the experiments become large and visible. The SST is a good example. I looked on that program as an experiment. We can find out about environmental factors without actually building these experimental aircraft. The things we can't find out concern, for example, the titanium fabrication technology and noise suppression.

Neither the President nor I believed that the country should commit to production of SST's before the environmental, technological, and economic answers were in. We did believe that the program was in the tradition of exploring the unknown, trying to extend the state of the art, and keeping the U.S. in the forefront.

I agree with Dr. James Watson when he says that experiments in biology, particularly concerning human reproduction, may raise possibilities which will have to be regulated by law. But that has nothing to do with the experimentation which might lead to these possibilities. My only feeling is that we not try to put limitations on experiments because the results may not agree with current social ideas, may upset our beliefs, or that we are afraid that society can't deal with the results satisfactorily. It is very clear that the advance of knowledge and technology cannot be suppressed. If we don't do experiments of a particular sort, somebody else will. We will have to confront problems that arise in an enlightened way in any case.

When I say we should not put constraints on experiments, I am not calling for atrocities in experimentation, either. There are ethics, morals, and laws to protect us against that. More are being adopted as they are needed.

Now on the other side, we must look very carefully at technology before we introduce it. I wouldn't dignify what's been done so far under the rubric of technology assessment as being adequate.

R&D cutbacks were the result of a change in priorities . . .

A lot of people say that the R&D funding problems began when Lyndon Johnson and the scientists had a falling out over Vietnam. Well, I can't make any judgment on that, but looking at the past two years — the budget and so forth — I have seen absolutely no evidence of it. There might have been some of that in earlier years, but I certainly don't find any evidence of it today. In spite of the fact that certain Administration programs are being opposed by some scientists, we have not allowed that to interfere with our allocation of priorities and resources. Look at the NSF budget; it was a Presidential decision to boost it $116 million. And the President is the one who decided on the cancer initiative. That's his program.

The effect of the cutback in federal R&D funding in the past few years has been larger in the development areas than it has in the research areas, with some few exceptions such as physics, where the cutbacks have been very substantial. I look on that as a time of a transition, a pause. I would say it has been a time of reform and a time of bringing the situation into a realistic relationship with the ongoing activities of the society. It's all the result of the change of priorities and not a punitive matter.

I, for example, was on five visiting committees of universities before I came to this job. These were engineering schools primarily. There was no great pain. Things were not growing at the rate people had become accustomed to, but the research efforts in those schools were proceeding reasonably well. Perhaps people weren't able to do all the new things they wanted to do, but I wouldn't call that a crisis situation.

The funding problem of the universities themselves – which I think is somewhat apart from the purely scientific and technological parts of the university – is very serious. Most of the universities are operating at a deficit. Most are taking steps to rectify that situation. However, we're looking at various possibilities to help. We're asking ourselves what role the Government should play.

We have taken note of the state of the medical school finances and we did something about that. Now whether we have done enough or whether we should do more, we don't know. The total input to the medical schools next year will be almost $100 million more than it was last year if the Congress approves. That does not include increased R&D funds. Now if we can do that in the medical schools when we recognize a crisis, we can also do it in other schools when and if the situation warrants.

Current Literature

ALASKA PIPELINE

425. **Gillette, R., "Trans-Alaska Pipeline: Impact Study Receives Bad Reviews",** *Science,* **v. 171, no. 3976, 19 March 1971, pp. 1130-1132.**

Describes criticism by conservationists, the Army Corps of Engineers, the Defense Department, and economists, of the Interior Department's environmental-impact statement (required by the National Environmental Policy Act of 1969) concerning the proposed trans-Alaskan pipeline; Interior is charged with understating the environmental hazards, inadequate consideration of alternatives, and exaggerating the economic benefits.

426. **Norgaard, R. B., "Statement by Richard B. Norgaard",** *Congressional Record,* **v. 117, no. 66, 6 May 1971, pp. E4089-4090.**

Offers refutations to the arguments in the Environmental Impact Statement on the Alaskan pipeline that a pipeline conforming to Interior's stipulation will harm the environment less than any alternative transport method, and that the pipeline and its inevitable environmental damage are needed for "the strength, growth, and security of the U.S.".

427. **"An Alternative to the Trans-Alaska Pipeline",** *Congressional Record,* **v. 117, no. 40, 22 March 1971, pp. E2123-2127.**

A paper by two Michigan professors points out some "edaphic, ecologic, and economic factors which indicate that the Canadian alternative route should be given serious consideration" before any decision is made as to the transportation of North Slope oil; the Canadian route considered "extends from Prudhoe Bay south and east . . . to Fort McPherson near the Mackenzie River Valley, or parallel to it, into Alberta, to Edmonton, and from there to midwest U.S. markets"; four supporting articles, reprinted from various sources, are included.

428. **Brower, D., "Should the Alaska Pipeline be Approved?",** *New Scientist and Science Journal,* **v. 50, no. 746, 8 April 1971, pp. 79-81.**

Brower, President of Friends of the Earth, argues against the approval of the trans-Alaskan pipeline at our present state of development because of inadequate knowledge by industry and the Department of Interior on how to deal with problems the pipeline provokes; suggests taking the time "to explore route and utilization alternatives, to obtain better pipeline designs, to develop a safety system that works and to complete our research".

429. **Porter, W. W., III, "Competition Between Ecosystems",** *Congressional Record,* **v. 117, no. 55, 21 April 1971, p. S5273.**

Argues that the human ecosystem of the 200 million U.S. citizens depends heavily on oil, and it is the obligation of the U.S. government to give preferential treatment to this ecosystem over that of the strip of land to be used for the pipeline across Alaska; says the U.S. needs oil reserves now because of the possibility that the Mideast situation will erupt and cut off our major source of vitally needed oil.

430. **Aspin, L., "Pipeline Reports Suppressed",** *Congressional Record,* **v. 117, no. 64, 4 May 1971, pp. E3979-3981.**

Discusses the consequences of attempts by the Federal Government to suppress papers by H. Jorgenson and the Alaskan office of the Army Corps of Engineers which severely criticize the trans-Alaskan pipeline and the draft environmental impact statement from the Interior Department; looks at the problems of earthquakes, effect on the natives, and breaks in the pipeline, none of which was adequately covered in the impact statement.

431. **"Arctic Alaska-Canada Natural Gas Pipeline Research Initiated", Battelle's Columbus Laboratories News Release, 27 April 1971, 4 pp.**

Announces the launching of a $2 million research program to find how to build and operate a reliable natural-gas pipeline through the Arctic with a minimal effect on the environment; the research is sponsored by a consortium of companies, the Gas Arctic Systems Study Group; a highly instrumented 2,000-foot pipeline research facility now under construction in Alaska will be used for the study.

AUSTRIA

432. **"News and Reports: Austria",** *Science Policy News,* **v. 2, no. 5, March 1971, p. 52.**

Announces the introduction of a 10-semester course in computer science at Technical University of Vienna to meet the anticipated 1980 need for 3000 data-processing experts; the 1971 Finance Bill provides 2% of the total Federal budget (14% more money than in 1970) for university salaries, equipment, and buildings; the "inadequate" budget for University research is expected to be augmented by the National Assembly.

BIBLIOGRAPHIES

433. *Accessions List,* **Harvard University Program on Technology and Society, Information Center, issued bimonthly.** (Qualified requestors can be placed on the mailing list by writing to the Harvard University Program on Technology and Society, 61 Kirtland St., Cambridge, Mass. 02138.)

Consists of an annotated bibliography of current literature acquisitions by the Program, under about 24 alphabetically listed subject headings dealing with interactions among science, technology, government, and society; latest issue is No. 34, dated 1 June 1971, and containing 62 references.

434. **Weis, E. (Ed.),** *Supplement to a Checklist of Books for the Study of Science in Human Affairs: Survey III,* **ISHA Bulletin 8, Institute for the Study of Science in Human Affairs, Columbia University, New York, N.Y. 10027, October 1970, 92 pp.**

Adds 382 books to the 1040 given in the (still available) first *Checklist* (Bulletin 4), bringing it up to mid-1970; lists references alphabetically by author, then thematically by both author and sample subject.

435. *Ecology and the Natural Environment,* **Bibliography No. 7, April 1971, 9 pp.** (Requests to be put on the mailing list for this and future bibliographies should be sent to The Secretary, Science Studies Unit, Edinburgh University, 34 Buccleuch Place, Edinburgh EH8 9JT, Scotland, U.K.)

Lists 144 unannotated references under the headings 1. Values and Attitudes: Ethics and Religion, 2. Political & Legislative Aspects, and 3. Economic Aspects.

436. *Index to Literature on Science of Science,* **Research Survey & Planning Organization, CSIR, v. 6, nos. 9 and 10, September and October 1970, 27 pp.** (Available from the Research Survey and Planning Organization, CSIR, Rafi Marg, New Delhi-1, India.)

Contains 139 references to science policy literature published during the last quarter of 1969 in 23 Indian journals; listed under 13 different headings, including agriculture, education, manpower, society, industry, management, and trade.

BIOLOGICAL SCIENCES

437. **Mondale, W. F., "The Implications of Biomedical Research and Technology",** *Congressional Record,* **v. 117, no. 61, 29 April 1971, pp. S5912-5929.**

Presents a set of four articles concerned with biomedical research and technology; the first discusses the increasing problem of ethics stemming from advances in life science; the second describes the medical profession's attempts to cope with moral and ethical questions by means of "medical ethics panels"; the third examines the "promise and perils" in store for man as a result of biomedical research; the fourth summarizes "developments in test tube fertilization and discusses the possibilities for achieving a completely artificial fetal environment".

438. **Edwards, R. G., and Sharpe, D. J., "Social Values and Research in Human Embryology",** *Nature,* **v. 231, no. 5298, 14 May 1971, pp. 87-91.**

Discusses the difficult social and legal issues raised by the development of techniques for interfering with the early stages of human development; written by an embryologist and a lawyer, this article is based on a lecture and discussion held at the National Law Center of the George Washington University in December 1968.

BUDGET FOR SCIENCE AND TECHNOLOGY

439. **Lederman, L., and Windus, M.,** *Federal Funding and National Priorities; an Analysis of Programs, Expenditures, and Research and Development,* **Praeger Special Studies in U.S. Economic and Social Development, Praeger Publishers, New York, 1971, 213 pp. ($17.50)**

Deals with "the Government's allocation of fiscal resources as an indicator of implicit priorities and the relationship of R&D funding to these priorities"; covers fiscal years 1961-71; 53 tables, 5 figures, and a selected bibliography.

440. **Schultze, C. L., et al.,** *Setting National Priorities: The 1972 Budget,* **The Brookings Institution, Washington, D.C., 1971, 336 pp. ($6.95, or $2.95 in paper).**

Examines President Nixon's proposed budget for FY 1972 with special attention to controversial issues that could profoundly affect the pattern of domestic spending in the future: major defense options, revenue sharing with the states, a national system to pay for medical care, and the Family Assistance Plan; presents facts, figures, and alternatives.

441. **"Budget Office Seeks Guidance on Science Problems",** *Physics Today,* **v. 24, no. 5, May 1971, p. 63.**

Presents highlights of a few of the talks given at a seminar on science and public policy on 22-24 February at the National Academy of Sciences; W. D. Carey, formerly with the Bureau of the Budget, indicates that the Office of Management and Budget is friendly toward science and technology, but has not been able to get guidance on scientific priorities; see also Ref. 407, *SPR,* **4** (1).

442. **Holmfeld, J. D., "National Science Foundation House Authorization Hearings",** *SPPSG Newsletter,* **v. 2, no. 4, April 1971, pp. 1-5.**

Presents a breakdown and analysis of the $622 million NSF budget request for FY 1972 and presents FY 1971 figures for comparison; topics are research project support, transfers to and from mission agencies, research applied to national needs, science education, and planning and policy studies.

443. **"RANN Cut Down to Size",** *Nature,* **v. 231, no. 5297, 7 May 1971, pp. 8-9; and "RANN Gets Rundown",** *Science News,* **v. 99, no. 20, 15 May 1971, p. 331.**

Discusses rearrangement of NSF priorities by the House Committee on Science and Astronautics – the first of four Congressional Committees that must screen the NSF budget; changes involve reducing the $81 million proposed for RANN (Research Applied to National Needs) by $30.6 million, cutting $11.7 million from scientific-research-project support, and using the $42.3 million thus saved to restore some of the decimated allocations for science education, institutional science, and scientific facilities and equipment.

444. **Thurow, L. C., "Research, Technical Progress, and Economic Growth",**

Technology Review, **v. 73, no. 5, March 1971, pp. 45-52.**

Attempts to answer the question, "What are the connections between research expenditures, technical progress, and economic growth?"; although the growth of the economy is presumed to be influenced by research expenditures, a determined analytical search for the connection yielded less real evidence than might be expected; includes 6 charts and tables.

445. **Morrissey, J. E., "An R&D Tax Credit to Spur Productivity and Employment",** *Astronautics & Aeronautics,* **v. 9, no. 3, March 1971, pp. 12-15.**

Suggests allowing a tax credit of 7% for R&D expenditures as a means of stimulating industrial investment in R&D and thereby increasing productivity, employment, and GNP; uses statistics on numbers of scientists and engineers in defense industries and correlations of industrial productivity with R&D expenditures to show that within 2 years the plan would cause a $2.6 billion increase in industrial R&D and reemployment of 60,000 scientists and engineers.

446. **Woolsey, J. P., "Future Aerospace Funding Studied",** *Aviation Week & Space Technology,* **v. 94, no. 25, 21 June 1971, pp. 14-15.**

Describes testimony before the Senate Banking, Housing and Urban Affairs Committee discussing the pros and cons of a government loan guarantee of $250 million to Lockheed Aircraft Corp. to save the L-1011 trijet program.

447. **"Recession, Inflation Squeeze Research Institutes",** *Chemical & Engineering News,* **v. 49, no. 24, 14 June 1971, pp. 14-15.**

Describes the effects on the operations of nine of U.S.'s largest nonprofit, multidisciplinary research institutes, of the huge Federal cutbacks in R&D spending; tabulates changes in dollar volume of research and number of employees for each of the nine institutes between 1968 and 1970.

CANADA

448. **"Science Policy in Canada" (in French),** *La Recherche,* **v. 2, no. 10, March 1971, pp. 210-212.**

Presents a question-and-answer interview of Senator Lamontagne, chairman of the Canadian government committee on science policy, reiterating the backward state of scientific R&D in Canada and calling for a studied program to promote innovation.

449. **"Analyses and Comments on the Lamontagne Report",** *Science Forum 20,* **v. 4, no. 2, April 1971, pp. 6-13.**

Consists of an editorial by M. P. Bachynski calling for "constructive action" through new and progressive ideas and programs; an article by H. E. Gunning criticizing the science-policy report's "simplistic approach to a complex problem"; a review by H. Goldak contending that the report fails to stress technology (as distinct from science) sufficiently; and an analysis by England's Sir H. W. Melville.

450. **Lamontagne, M., "Senator Lamontagne Replies to the Critics of the Senate Science Report",** *Science Forum 21,* **v. 4, no. 3, June 1971, pp. 9-13.**

Consists of a discussion and rebuttal, by the chairman of the Senate special committee on science policy, of the criticisms of Volume I of the Senate report on Canadian Science Policy; some of the criticisms were published in *Science Forum 20* (Ref. 449).

451. **"Where the Federal Money Goes for Science and Technology",** *Science Forum 21,* **v. 4, no. 3, June 1971, p. 32.**

Discusses Canada's Federal science budget and impending conversion of the Science Secretariat of the Privy Council into a "new federal ministry of state for science"; outlines the proposed budget, staff, and functions the new ministry.

452. **Hamilton, D., "Canada's Manpower Mismatch",** *New Scientist and Science Journal,* **v. 50, no. 748, 22 April 1971, p. 187.**

Presents factors behind the present oversupply of scientists and engineers in Canada; predicts at least 2 years of continuing surpluses, and effective utilization of only half of this year's science and engineering graduates.

CHINA

453. **Suttmeier, R. P., "Party Views of Science: The Record of the First Decade",** *The China Quarterly,* **October-December 1970, pp. 146-168.** (Reprints available within limits of supply, from Prof. R. P. Suttmeier, Hamilton College, Clinton, N.Y. 13323.)

Traces the background and changing views of the Chinese toward science and describes how these views evolved during the 1950's as the basis for the Chinese Communist Party's (CCP) policy of considering science as a utilitarian tool "for economic and military development and as a means for transforming society"; discusses ramifications of the CCP's science doctrine, its problems and inconsistencies; liberally documented.

454. **Macioti, M., "Hands of the Chinese",** *New Scientist and Science Journal,* **v. 50, no. 755, 10 June 1971, pp. 636-639.**

Defines the relative position of the People's Republic of China in culture, education, science, nuclear technology, missiles, jet aircraft, and computers, and concludes that "China is emerging as the third scientific and technological power of the world".

455. **Jaubert, A., "Research and Development in China", (in French),** *La Recherche,* **v. 2, no. 11, April 1971, pp. 339-349.**

Presents a detailed review of the cultural revolution in Mainland China and its impact on China's role in the world of science, medicine, and technology.

456. **"From Ping Pong to Science: Cautious Hope",** *Science News,* **v. 99, no. 19, 8 May 1971, p. 313.**

Discusses a possible increase in U.S.-China collaboration in scientific efforts, in the light of the U.S. table tennis team's visit to China and the appearance of a group of Chinese scientists at a scientific conference (in Bordeaux) last March for the first time in 5 years; reviews past attempts to collaborate and our knowledge of current Chinese science activities.

457. **"China: No Theoretical Research",** *Chemical & Engineering News,* **v. 49, no. 23, 7 June 1971, p. 14.**

Records firsthand observations by two U.S. biologists during a 32-day visit to China and North Vietnam; reports that both countries have sophisticated scientific establishments, modern equipment, well-stocked libraries, and concentrate almost exclusively on applied research.

DEVELOPING COUNTRIES

458. **Jones, G.,** *The Role of Science and Technology in Developing Countries,* **Oxford University Press, London, 1971, 192 pp. (£ 1.75, or 90p for paperback.)**

Covers science policy, organization of R&D, application of science and technology to industry, to agriculture, and to exploitation of natural resources, and education and manpower; based on a study sponsored by the International Council of Scientific Unions.

459. **Brown, H., "Science, Technology and the Developing Countries",** *Bulletin of the Atomic Scientists,* **v. 27, no. 6, June 1971, pp. 10-14.**

Describes graphically the widening gap between the "culture of the affluence and the culture of poverty" and discusses what can and should be done by the rich countries to expedite the economic development of the poor countries to save them from starvation, disease, and deprivation; advocates creation of President Nixon's proposed International Development Institute (IDI) to administer the technical-assistance programs.

460. **"Science Center Blossoms on Crete",** *Chemical & Engineering News,* **v. 49, no. 16, 19 April 1971, p. 50.**

Describes the efforts of the International Science Foundation (ISF) to assist technologically underdeveloped countries; discusses conferences being held to define and solve the problems of Third World countries; gives plans for residentships and action projects.

461. **"Nixon Proposes International Development Program",** *Washington Science Trends,* **v. 26, no. 5, 10 May 1971, p. 26.**

Announces President Nixon's request for the creation of a new International Development Institute with a 3-year appropriation of $1,275 million "to focus U.S. scientific, technological and managerial know-how" in the physical and social sciences on helping developing nations build institutions to solve such problems as population growth, inadequate food supply, lack of educational facilities, unemployment, and urban problems.

EDUCATION

462. **"Recent Trends in Enrollment and Manpower Resources in Graduate Science Education, 1969-70",** *Science Resources Studies Highlights,* **National Science Foundation Report NSF 71-14, 26 May 1971, 4 pp.**

(Available from the Office of Economic and Manpower Studies, National Science Foundation, Washington, D.C. 20550.)

Presents statistics on the 146,000 full-time and 43,000 part-time graduate students in 3,071 doctorate science departments for the academic year 1969-70, giving enrollment by field, types and sources of major support, and number of faculty and postdoctoral appointees.

463. *Doctorate Recipients From United States Universities, Summary Report 1970,* **National Research Council, Report OSP-MS-4, March 1971, 9 pp.** (Available from Manpower Studies Branch, Office of Scientific Personnel, National Research Council, 2101 Constitution Ave., N.W., Washington, D.C. 20418.)

Presents a brief summary of the FY 1970 data obtained from the annual OSP questionnaire on earned research doctorates; shows numbers in seven broad fields (physical sciences, social sciences, etc.) for each year from 1965 on; gives 1970 figures by subfields, sex, citizenship, marital status, age, postdoctoral plans, sources of support, and state.

464. **Drew, D. E., "On the Allocation of Federal Funds for Science Education",** *ACE Research Reports,* **v. 5, no. 7, December 1970, 44 pp.** (Available from the Office of Research, American Council on Education, One Dupont Circle, Washington, D.C. 20036.)

Describes the College Science Improvement Program (COSIP), under which the National Science Foundation has made 105 grants ($18 million total) through 1969 with the goal of improving undergraduate science education; presents techniques and analyzes results of a survey directed toward identifying initial differences between schools receiving COSIP grants and other eligible schools, as the first phase in an empirical evaluation of the COSIP.

465. **"Federal Support to Universities and Colleges, Fiscal Year 1970",** *Science Resources Studies Highlights,* **National Science Foundation, Report NSF 71-16, 11 June 1971, 4 pp.** (Available from Office of Economic and Manpower Studies, National Science Foundation, Washington, D.C. 20550.)

Analyzes university appropriations by funding level (lowest since 1966), type of activity (R&D, facilities, other science, nonscience), source agency (HEW, NSF, DoD, Agriculture, NASA, AEC), geographic distribution (among 10 U.S. regions), and ranking of institutions; includes list of 100 schools receiving largest amounts in FY 1970, led by MIT with $100.2 million.

466. **Wilson, J. T., "A Dilemma of American Science and Higher Educational Policy: The Support of Individuals and Fields versus the Support of Universities",** *Minerva,* **v. 9, no. 2, April 1971, pp. 171-196.**

Examines the history of U.S. science policy and programs which, until the Johnson Administration, emphasized the advancement of the sciences and the development of the individual student or scientist and shunned institutional support; discusses four problems of major concern in connection with Federal support of academic science activities.

467. **Walsh, J., "Higher Education: Will Federal Aid Favor Students or**

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Institutions?", *Science,* **v. 171, no. 3977, 26 March 1971, pp. 1219-1221.**

Discusses the contest between the "Nixon Administration and Hill Democrats" as to whether Federal aid will emphasize the student or the institution; the administration supports student aid; says a compromise might well be the outcome.

468. **York, C. M., "Steps Toward a National Policy for Academic Science",** *Science,* **v. 172, no. 3984, 14 May 1971, pp. 643-648.**

Defines academic science as that portion of basic research, applied research, and development activities which is done on the campuses of universities and colleges; delves into the problem of arriving at an appropriate level of federal funding for academic science; recommends that the total federal support for academic science be stabilized and that a temporary freeze be imposed on the level of direct support for graduate students.

469. **Mirand, E. A., "Federal Aid Authorization for Science Education",** *Congressional Record,* **v. 117, no. 70, 13 May 1971, pp. E4397-4399.**

Presents testimony at a House Subcommittee hearing in support of restoration of $2 million in the FY 1972 NSF budget for continuation of the highly successful Student Science Training Program (SSTP), for acquainting talented high-school juniors with the latest concepts of science.

470. **"Society, Environment, and Science Course",** *Congressional Record,* **v. 117, no. 72, 17 May 1971, pp. E4515-4516.**

Describes an elective high-school course being initiated at Lawnsdowne Senior High School, Baltimore, Maryland; says the purpose of the course is to "create an awareness on the part of the student of the social implications of biological problems through the use of a model".

471. **Marland, S. P., Jr., "Environmental Education Cannot Wait",** *Congressional Record,* **v. 117, no. 61, 30 April 1971, pp. S6015-6017.** (Reprinted from May 1971 *American Education.*)

Describes the philosophy behind the provisions and application of the Environmental Education Act, Public Law 91-516; discusses some funding and reform aspects of the act.

472. **"Engineers Train for Role in Public Affairs",** *Chemical & Engineering News,* **v. 49, no. 16, 19 April 1971, pp. 51-52.**

Describes the Carnegie-Mellon University's plans to "create a new kind of engineer" by combining the social humanities and engineering into a 4-year curriculum leading to the degree of B.S. in Engineering and Public Affairs (E&PA); courses provide a physical science background, options in various fields of engineering, concentration in analysis of social and political systems, and interdisciplinary electives.

473. **Holloway, B., "Great Expectations?",** *New Scientist and Science Journal,* **v. 50, no. 752, 20 May 1971, pp. 442-444.**

Points to the lack of correlation of the number of qualified scientists and engineers (QSE's) with R&D spending or with national economic growth as one of the factors in our current QSE oversupply; suggests that higher education be restructured to include sociological aspects, so as to produce scientists and engineers with flexibility.

474. **Trotter, R. J., "What People Know",** *Science News,* **v. 99, no. 18, 1 May 1971, p. 306.**

Describes the background and results of a continuing National Assessment of Educational Development under the Federal Education Commission; results from an 80,000-student sample in 4 age groups between 9 and 35 showed, among other things, that males usually performed better than females in science, and that students tested in big cities (over 200,000 population) and in small towns were all below the national average.

475. **McCarthy, C., "Universities and the Future",** *New Scientist and Science Journal,* **v. 50, no. 752, 20 May 1971, pp. 440-442.**

Calls attention to the problems created in English technical education by forcing students to specialize increasingly as they progress; questions whether this equips them to adjust to the needs of society and the expected drastic changes of technology over their working life; discusses the problem of predicting future needs for designing current curricula.

476. **Berry, M., "Manpower for and from Schools",** *New Scientist and Science Journal,* **v. 50, no. 752, 20 May 1971, pp. 444-446.**

Discusses the teaching of science and mathematics in Britain as it relates to the student becoming a science or math teacher versus his specializing outside the classroom in a scientific field; delves into the requirements for a good science teacher.

477. **"Schools Move to Bridge Academic-Industry Gap",** *Chemical & Engineering News,* **v. 49, no. 23, 7 June 1971, pp. 26-27.**

Discusses techniques by which universities are attempting to better prepare students for employment in industry; emphasizes the need for greater communication between industry and academia, and for flexibility of college curricula.

478. **"Policy Implications of the Growth in Higher Education",** *The OECD Observer,* **no. 50, February 1971, pp. 13-18.**

Presents highlights of changes in higher education between 1950 and 1967 in the 22 OECD Member countries, as revealed by a statistical survey carried out by OECD's Scientific Directorate and analyzed by the Educational Investment and Development Division; draws some implications for policy formulation.

479. **"New Publications",** *Science,* **v. 171, no. 3975, 12 March 1971, p. 988.**

"The Assembly on University Goals and Governance of the American Academy of Arts and Sciences has issued a report containing 85 suggestions for the revitalization and reorientation of colleges and universities. The report may be obtained from *Daedalus,* 7 Linden St., Cambridge, Mass. 02138."

480. **"Few Women in Academia",** *Chemical & Engineering News,* **v. 49, no. 19, 10 May 1971, pp. 21-22.**

Cites the results of a survey of 172 U.S. Ph.D.-granting college and university chemistry faculties, indicating that only 2.2% of the teachers are women and nearly 60% of the schools have no women on their chemistry faculties.

481. **Jevons, F. R., "Education, Science and Society",** *Advancement of Science,* **v. 27, no. 133, March 1971, pp. 227-232.**

Delves into the two ways of looking at science education: as a liberal study involving creativity, aesthetics, and moral values, or as being specialized and narrow; observes that technical people in industry are mostly engaged in decision making rather than in R&D and discusses what this means to the individual; describes the Manchester Science Greats course, which deliberately adds a "liberal" dimension to science education.

482. **Perrott, E., "Science as a Liberal Study",** *Advancement of Science,* **v. 27, no. 133, March 1971, pp. 233-238.**

Discusses the role that science should occupy in the secondary-school curriculum in the '70s, emphasizing the need for the interdisciplinary approach to prepare students to apply science in social and humanistic contexts and discussing the kind of training teachers must have to be effective.

483. **"Universities and the Teaching of Policy Sciences – Part II",** *Policy Sciences,* **v. 2, no. 1, March 1971, pp. 1-85.**

Adds six papers and an epilogue to the five papers published in v. 1, no. 4 [see *SPR*, 4 (1):Ref. 48], dealing with organizations, programs, techniques, and experiences in the teaching of policy sciences; the Issue Editor's Epilogue presents some conclusions and dilemmas brought out by the 11 papers, suggesting that "policy sciences teaching is in an experimental stage" and should be advanced by "sequential decision-making based on constant learning".

484. **Ericson, R. F., "The Policy Analysis Role of the Contemporary University",** *Policy Sciences,* **v. 1, no. 4, December 1970, pp. 429-442.** (Available as Reprint No. 11 from Program of Policy Studies in Science and Technology, Room 800, 2100 Pennsylvania Ave., N.W., Washington, D.C. 20006.)

Blames "rigid academic departmentalization" for the inability of universities to provide the guidance needed to enable society to make optimum policy judgments on alternative futures; recommends that universities adopt "vigorous new inter- and transdisciplinary" approaches "consonant with general systems concepts, cybernetic science and computer technology"; see Ref. 48, *SPR*, 4 (1), and Ref. 483 (above) for allied papers.

ENERGY CRISIS

485. **Gaucher, L. P., "Energy in Perspective",** *Chem Tech,* **March 1971, pp. 153-158.**

Places the entire energy crisis in perspective by examining the history of energy consumption in all its forms; makes projections through the year 2200 of the total energy requirements for the

United States; discusses the contribution that individual energy sources will make toward meeting the huge energy demands of the future; predicts that new sources of energy will be developed; includes four charts which show energy consumption in the U.S. – past and future.

486. **Ewald, E., "Energy Alternatives – Now and in the Future",** *Edison Electric Institute Bulletin,* **v. 39, no. 2, March/April 1971, pp. 61-63.**

Chairman of the Northern States Power Co. enumerates the critical energy-related issues facing the world today – population growth and production-consumption patterns; discusses energy conservation, economic and environmental considerations, and what should be done to meet the needs; recommends that all electric utilities commit at least 1% of gross revenue for R&D.

487. **"Power Crisis – Electricity, Oil, Coal",** *U.S. News & World Report,* **v. 70, no. 19, 10 May 1971, pp. 84-86, 89-91.**

Consists of a question-answer interview with T. G. Bradshaw, President, Atlantic Richfield Company; discusses the increasing energy crisis, the development of a new national energy policy, the need for Alaskan oil, dependency on Mideast oil, and future nuclear energy plants.

488. **Sherrill, R., "Power Play",** *Congressional Record,* **v. 117, no. 56, 22 April 1971, pp. S5436-5440.** (Reprinted from *Playboy,* May 1971.)

Discusses the developing cooperation between the electric-power industry and the fuel industry to counter antipollution regulations with lobbying, propaganda, and contrived shortages; contends that there would be no power shortage in the U.S. if there were a "national transmission grid" to deliver power where and when it is needed; discusses unconventional power sources (solar, magnetohydrodynamics, and breeder reactors), and indicates that nuclear fusion "could be the perfect solution" to the problem of providing ample power without pollution.

489. **"Wyoming Professor Says Present Fuel Supplies Short; Man Will Have to Rely on Solar-Derived Energy Soon",** *Congressional Record,* **v. 117, no. 78, 25 May 1971, pp. E5042-5043.** (Reprinted from May 16 Laramie, Wyo., *Boomerang.*)

Discusses the expected shortage of coal and the need for efficient methods of converting coal to electricity; questions the potential of nuclear energy; envisions complete recycling of carbonaceous materials, producing electricity and utilizing waste heat for heating buildings and the waste CO_2 from combustion for stimulating plant growth.

490. **"Creating a Select Committee to Investigate Energy Resources",** *Congressional Record,* **v. 117, no. 79, 26 May 1971, pp. H4379-4398.**

Presents House Resolution 155, creating a House select committee to investigate the availability and ownership of energy reserves, pricing practices, expansion of fuel transport facilities, measures for meeting electricity demands, and environmental effects of the electric power industry; includes extended discussion by various Representatives for and against the Resolution, which was rejected by a roll-call vote of 128 yeas to 218 nays.

491. "Comeback for Coal", *Nature,* v. 230, no. 5291, 26 March 1971, p. 201.

Reports that Western Europe is entering a decade in which the price of fuel will become great enough to make the full utilization of coal reserves desirable and economically worthwhile; explains cutbacks in coal production which took place during 1960 to 1970; discusses world consumption of fuel in the future and how prospects seem to depend heavily on how quickly the coal-mining industry can be revived.

ENERGY – ENVIRONMENT

492. **Ramey, J. T., "Environment, Energy and Engineering",** *AEC News Releases,* **v. 2, no. 13, 31 March 1971, pp. 3-9.**

In a talk before the National Academy of Engineering's Forum on Power Plant Siting, Commissioner Ramey discusses solutions to the increasing difficulties being encountered in meeting the country's need for electrical energy; reviews recommendations of the Interagency Power Plant Siting Group to resolve "the apparent conflict between power needs and environmental protection"; discusses alternative (nonnuclear) methods of power generation and urges development of the resources and data needed to evaluate the benefits, costs, and risks of the available alternatives.

493. **Altman, M., "The Environment-Energy Balance: Needed Actions",** *Mechanical Engineering,* **v. 93, no. 5, May 1971, pp. 33-36.**

Enumerates the growing problems that the electric-power-generation industry is experiencing and discusses possible solutions; suggests that a step in the solution of these problems would be to form a National Energy and Electric Power Administration; calls for universities to produce "graduates who are trained and motivated in problem-solving" and for utilities to work with the universities.

494. **Randolph, J., "Energy, Environment, and the Economy",** *Congressional Record,* **v. 117, no. 58, 26 April 1971, pp. E3465-3467.**

Discusses the fuels and energy situation, present and future, in the U.S., pointing out the problems and dangers; calls for the formation of a "coherent national energy policy", pointing out that a "balanced federal policy can promote energy growth and economic growth and better protection of the environment at the same time"; reprint of speech at U.S. Chamber of Commerce action forum.

495. **Collins, J. M., "Electricity and the Environment",** *Congressional Record,* **v. 117, no. 82, 2 June 1971, pp. H4562-4564.**

Describes the unpublicized efforts of the electric utility industry to better the environment through air-, water-, and thermal-pollution control and also through land-use accomplishments.

496. **Yarosh, M. M., "The Crisis In Power-Plant Siting",** *Mechanical Engineering,* **v. 93, no. 6, June 1971, pp. 10-13.**

Examines future demands for electric power and power plant siting problems related to these demands; discusses siting practices and the need for multidisciplinary technological assessment in resolving these problems.

497. **Hosmer, C., "Electric Power to Fight Pollution",** *Congressional Record,* **v. 117, no. 46, 31 March 1971, pp. E2585-2586.**

Includes an excerpt from a talk by Dr. Glenn T. Seaborg made before the National Press Club on March 22, 1971, in which he explained why a cutback in electric power would do more harm to the environment than power production; to cut back on the production of power would cripple our chances of cleaning up our air, water, and industrial waste; he considers nuclear power the source of energy least harmful to the environment.

498. **"Interview With Dr. James H. Wright – Is Politics the Real Polluter?",** *Congressional Record,* **v. 117, no. 67, 10 May 1971, pp. E4171-4174.** (Reprinted from *Electrical World.*)

Presents views of the director of Westinghouse's Environmental Systems Dept. (Power Systems) on the environmental movement, air-pollution abatement, thermal utilization, and environmental education; he contends that the real solution to the overall pollution problem lies in a systems approach and greatly expanded use of electric power from large nuclear plants.

499. **Morrison, D. L., Erb, D. E., and Reid, W. T.,** *Energy in the Urban Environment,* **AIAA Paper 71-526, presented at Urban Technology Conference, 24-26 May 1971, 10 pp.** (Available until December 1971 from AIAA, 1290 Avenue of the Americas, New York, N.Y. 10019. Price: $2.00.)

Expounds on the theme that the electric-power industry, itself labelled a polluter, must continue to expand to supply electricity for the pollution-abatement equipment of the future, as well as for the demands of our economy; discusses particulate, radioactive, and thermal effluents from power plants and means for minimizing their effects.

500. **"Like Ripping Apart St. Peter's, In Order to Sell the Marble",** *Congressional Record,* **v. 117, no. 82, 2 June 1971, pp. E5286-5287.** (Reprinted from the May 20 *Los Angeles Times.*)

Discusses the effect on the environment of six power plants and three strip mines which are now being built at and around Black Mesa, Arizona; describes legal efforts by the Hopi Indians to block the construction.

501. **"EPA Praises Interior Study of Southwest Power Developments",** *Environmental News,* **Environmental Protection Agency, Washington, D.C. 20460, 12 June 1971, 2 pp.**

Discusses the Department of Interior's plan to halt a series of proposed developments related to Southwestern power-generating projects and to conduct studies to distinguish between real and simulated power needs, define the effects of sulfur emissions and cooling-tower moisture, and explore the possibility of recycling plant and mining wastes.

ENERGY – GEOTHERMAL STEAM

502. **Cole, B. L., "Washington State May Hold Geothermal Power Promise",** *Congressional Record,* **v. 117, no. 73, 18 May 1971, pp. S7188-7189.**

Discusses the availability and need for the development of geothermal power to generate electricity in the State of Washington; refers to the Pacific Northwest conference on 21 May 1971 in Olympia, Wash., to review current knowledge relating to the use of geothermal power.

ENERGY – NATIONAL POLICY

503. *Fuels and Energy,* **Hearings Before the Subcommittee on Minerals, Materials, and Fuels of the Committee on Interior and Insular Affairs, U.S. Senate, Ninety-first Congress, Second Session, on S. 4092, 10-11 September 1970, 256 pp.** (Available from U.S. Senate, Committee on Interior and Insular Affairs, Washington, D.C. 20510).

Presents statements and communications relevant to "a bill to establish a Commission on Fuels and Energy to recommend programs and policies intended to insure that United States requirements for low-cost energy will be met, and to reconcile environmental quality requirements with future energy needs"; appendix includes text of the bill.

504. **Garvey, J. R., "A Realistic Federal Government Policy on Energy Research",** *Congressional Record,* **v. 117, no. 42, 24 March 1971, pp. E2155-2157.**

Questions whether or not the Federal Government is spending billions of dollars on kinds of research that should have a low priority; considers that overemphasis on atomic-power research in recent years has been a deterrent to proper energy-supply planning; discusses our imperative energy problems: the growing demand for and declining reserves of natural gas, and the control of environmental damage from fuel production and use; an address to the Washington Coal Club by the president of Bituminous Coal Research, Inc.

505. **Morton, R.C.B., "New Secretary of Interior Rogers Morton Outlines His Energy Goals",** *Offshore,* **v. 31, no. 4, April 1971, pp. 59-62.**

States briefly our energy problems and discusses the solution, which is to achieve a new balance of reliability in energy supply, not merely oil and gas, but energy in all its usable forms; this will require that we have some machinery to assure our policies will complement rather than compete with each other, as they have in the past; includes a short biography and a portrait of Secretary Morton.

506. **Tower, J. G., "The Nation's Energy Resources",** *Congressional Record,* **v. 117, no. 31, 9 March 1971, pp. S2708-2709.**

Comprises a statement by Senator Tower before the Senate Interior and Insular Affairs Committee urging his colleagues to give Senate Resolution 45 their full and favorable consideration; the resolution calls for an in-depth investigation of our Nation's energy resources; based on this investigation, the Interior Committee would recommend national-energy-policies legislation designed to insure adequate exploration, development, utilization, and conservation of our reserves of energy resources.

507. **"Support Grows for Study of Nation's Energy Problems",** *Congressional Record,* **v. 117, no. 38, 18 March 1971, pp. H1759-1762.**

Includes remarks by Representative Richard H. Fulton of Tennessee and text of his House Joint Resolution to establish a Select House Committee to investigate the energy resources of the United States; discusses problems existing in the national energy picture today; a table in H. Res. 155 summarizes the load-supply situation for electric power during summer 1971 on a region-by-region basis.

508. **Simpson, J. W., "Electric Power – More or Less",** *Congressional Record,* **v. 117, no. 30, 8 March 1971, pp. E1564-1566.**

Points out that a cutback in power production would cause even greater problems than we now face; with the help of present and foreseeable technology and through management of energy resources, electric-power production will not only meet the needs of our population growth, higher living standards, economic expansion, and agricultural production, but also help solve environmental problems.

509. **McCracken, P. W., "National Energy Problems and Prospects",** *Congressional Record,* **v. 117, no. 44, 29 March 1971, pp. S4016-4018.**

Explores what some of the elements of an overall national energy policy should be; enumerates three relevant national objectives: a vigorously growing economy, clean fuels that will not pollute the environment, and reliable fuel supplies; gives a picture of our energy consumption needs in the future and discusses where the energy will come from; suggests that we must have a new imaginativeness about research and development, and greater economic incentives.

510. **"A National Commitment to Develop the Fast Breeder Reactor by 1980",** *Atomic Energy Clearing House,* **v. 17, no. 23, 7 June 1971, pp. 1-10.**

Presents the text and a summary of President Nixon's energy statement to the Congress, supporting development of the fast-breeder reactor, doubling Federal spending for sulfur oxide control demonstration projects, and increasing the programs in fusion and coal gasification; the statement also authorizes expansion of the Interior Department's lease offerings for oil, gas, and geothermal-energy sources, and spells out some energy-conservation measures.

511. **Fulton, R., "Summary Statement of H. Res. 155, by Hon. Richard Fulton, Before the House Rules Committee, May 18, 1971",** *Congressional Record,* **v. 117, no. 73, 18 May 1971, p. E4580.**

Gives support to the resolution for the creation of a Select Committee on Energy Resources to lay a basis for Congress to guide the U.S. through the task of obtaining both economic expansion and a livable environment.

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512. **Bagge, C. E., "Plans, Programs and Economics of the Coal Industry to Meet Power Requirements",** *Congressional Record,* **v. 117, no. 30, 8 March 1971, pp. E1582-1584.**

Presents views of the National Coal Association with regard to the problem of meeting America's increasing power requirements and offers some suggestions as to how we can best meet these power needs; reports that the coal industry firmly supports the adoption of a realistic national energy policy which recognizes the critical need to utilize our abundant fossil-fuel reserves without damage to the environment.

513. **Gillette, R., "Energy: President Asks $3 Billion for Breeder Reactor, Fuel Studies",** *Science,* **v. 172, no. 3988, 11 June 1971, pp. 1114-1116.**

Describes President Nixon's new "technological initiative" for the science community to focus efforts toward obtaining "clean energy" from fossil and nuclear fuels; discusses selected aspects of Nixon's recent energy statement.

ENERGY – NUCLEAR

514. **Ramey, J. T., "Nuclear Power: 1971", speech before the San Francisco Electric Club on March 15,** *AEC News Releases,* **v. 2, no. 14, 7 April 1971, pp. 5-10.**

Discusses where nuclear power stands today in the U.S. and what its future contributions are expected to be; reviews the status of the current commercial nuclear power plants – those employing light-water reactors; gives an appraisal of some of the key problems currently facing us and discusses the future of the fast breeder reactor and nuclear desalting; includes 10 references.

515. **Seaborg, G. T., "On Misunderstanding the Atom",** *Congressional Record,* **v. 117, no. 47, Part II, 1 April 1971, pp. E2651-2654.**

Points out the need for greater public understanding of nuclear power and of its tremendous potential in peaceful pursuits; deals with three questions that relate to the nuclear power controversy: "Do we need all that power? If so, why should it be nuclear? If nuclear, can we have it safely?"; gives basic reasons why we must move ahead with the very best development and use of nuclear power without undue delay; speech given at the National Press Club Luncheon, March 22, 1971.

516. **Johnson, W. E., "People, The Environment, and Power", Remarks before the Northwest Public Power Association, Eugene, Oregon, 3 June 1971,** *AEC News Releases,* **v. 2, no. 23, 9 June 1971, pp. 20-22.**

Examines electric power usage in the U.S. as it relates to the single citizen and the GNP; discusses energy needs of the future and concludes that "the use of nuclear energy is inevitable".

517. **Ramey, J. T., "Nuclear Power's Role in the Changing Electric Utility Industry", Remarks before the American Public Power Association, San Juan, Puerto Rico, 4 May 1971,** *AEC News Releases,* **v. 2, no. 23, 9 June 1971, pp. 7-14.**

Reviews the needs and current status of nuclear power, the fast breeder program, and other nuclear power programs; examines some current issues concerning nuclear power generation, including safety and environmental considerations.

518. **Gravel, M., "Nuclear Power and Alternatives",** *Congressional Record,* **v. 117, no. 32, 10 March 1971, pp. E1704-1706.**

Consists of a set of questions and answers setting forth Senator Gravel's views on our energy problems and announcing his intention to submit legislation which will remove preferential treatment for nuclear power plants and establish an Energy-Environment Commission instead of an Atomic Energy Commission; describes nuclear power hazards, alternative sources of energy, and some possible solutions to the electricity versus environment dilemma – a news release by the Senator from Alaska.

519. **Seaborg, G. T., "A Decade of Maturation for Nuclear Energy in the United States Lies Ahead" (in Italian),** *Notiziario Comitato Nazionale Energia Nucleare,* **v. 16, no. 6, June 1970, pp. 45-52.**

Discusses the prospects of nuclear energy in the next 10 years; states that the main use of nuclear energy will be for power generation – controlled nuclear fusion has great possibilities, but its development will require many years; reviews the many uses of radioisotopes and the new possibilities in basic physics.

520. **Hosmer, C., "The Atom Versus the Environment",** *Congressional Record,* **v. 117, no. 29, 5 March 1971, pp. E1513-1515.**

Discusses the reasonable doubt about the wisdom of developing nuclear energy at all; condemns environmental extremism and considers nuclear-generated electricity to be man's brightest hope for reducing and eliminating the whole spectrum of pollutants.

521. **Kelley, J. B., "AEC Can't Be Both Promoter, Regulator of Industry",** *Congressional Record,* **v. 117, no. 28, 4 March 1971, pp. E1505-1506.**

Discusses the contradictory roles of the Atomic Energy Commission as both promoter and regulator of the use of atomic energy; suggests that licensing procedures be transferred to the Environmental Protection Agency to increase public confidence in licensing procedures.

522. **Hosmer, C., "Nuclear Matters",** *Congressional Record,* **v. 117, no. 60, 28 April 1971, p. E3655.**

Presents extracts from a speech to the Southern Interstate Nuclear Board dealing with environmental radiation, private financing of nuclear industries, Plowshare natural gas, uranium enrichment, and breeder reactors.

523. **Gravel, M., "Should We Back, or Sack, The Breeder?",** *Congressional Record,* **v. 117, no. 61, 29 April 1971, pp. S5906-5907.**

Looks at the environmental problems that could result from the extreme toxicity of plutonium if this country develops and adopts the plutonium-fueled fast-breeder reactor; says the problem is international in scope; calls for "vigorous and public discussion" of the breeder program and alternatives.

524. **Gravel, M., "Reason to be Worried",** *Congressional Record,* **v. 117, no. 39, 19 March 1971, pp. S3435-3439.**

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Stresses urgency of a moratorium on building nuclear plants until the safety problems are resolved; comments on accident consequences, basic safety problems, dependence on untested safeguards, design defects, unconvincing safety claims, and haphazard engineering practices.

ENVIRONMENTAL AGENCIES

525. **Miller, S., "ES&T Interview: William Ruckelshaus",** *Environmental Science & Technology,* **v. 5, no. 5, May 1971, pp. 391-393.**

Presents a question-and-answer interview of the administrator of the Environmental Protection Agency (EPA); discusses EPA's priorities, enforcement of standards, and organization of EPA; says environmental problems will not be solved by 1975.

526. **"Council on Environmental Quality",** *Congressional Record,* **v. 117, no. 60, 28 April 1971, pp. E3607-3639.**

Reprints the first three issues of the *102 Monitor,* a monthly publication named after Section 102(2)(C) of the National Environmental Policy Act, listing draft and final environmental-impact statements and comments received by the Council; first issue quotes the Act (P.L. 91-190) and gives detailed guidelines for preparing environmental-impact statements; explains how the Army Corps of Engineers, the AEC, and the Federal Power Commission handle the 102 statement process; the *102 Monitor* is available to qualified recipients on request from Gay Boyer (Editor), Council on Environmental Quality, 722 Jackson Place, N.W., Washington, D.C. 20006.

527. **"Publication from Council on Environmental Quality",** *Congressional Record,* **v. 117, no. 80, 27 May 1971, pp. E5151-5167.**

Consists of the entire text of the May 1971 issue of the Council on Environmental Quality's *102 Monitor* (see Ref. 526), presenting revised CEQ guidelines on environmental-impact statements, and the statements received by the CEQ during April from numerous government agencies and departments.

528. **"Commerce Scientists Play Many Roles in Environmental Cause",** *Commerce Today,* **v. 1, no. 14, 19 April 1971, pp. 3-9.**

Describes the type of research done by U.S. Department of Commerce scientists and engineers to better the present condition of air, water, and noise pollution; the international efforts of the National Oceanic and Atmospheric Administration (NOAA) are also reviewed.

529. **Lannan, J., "Army Engineers Take New Role",** *Congressional Record,* **v. 117, no. 60, 27 April 1971, pp. E3604-3605.** (Reprinted from the April 25 *Washington Star.*)

Describes the transformation of the Army's Corps of Engineers from "natures wrecker" to one of its "prime enhancers"; this is a result of the Corps' application of the Refuse Act of 1899, the cleaning of the Cuyahoga River, upgrading of the Board of Engineers for Rivers and Harbors to improve the project review function, Congressional authorization to include beautification and public access in project funding, and increasing emphasis on "quality of life".

530. **"NOAA Photoessay No. 1: A New Agency", U.S. Department of Commerce Publication NOAA/PI 70034, 1970, 8 pp.** (Available from Office of Public Information, National Oceanic and Atmospheric Administration, Rockville, Md. 20852.)

Presents a pictorial description of NOAA's activities concerned with exploring and charting the oceans and their mineral and nutritive resources, with monitoring and predicting long-term changes in environmental condition and quality, with detecting and warning against environmental hazards, and with the development of new technology for its missions.

531. **Bowers, R., et al, "A Program to Coordinate Environmental Research",** *American Scientist,* **v. 59, no. 2, March-April 1971, pp. 183-187.**

Points out the difficulties of establishing an optimum mechanism for coordinating and strengthening research on environmental problems; describes the operation of a proposed three-level organization, along with other approaches.

532. **Brotzman, D. G., "Proposal to Establish a Standing Committee on the Environment",** *Congressional Record,* **v. 117, no. 45, 30 March 1971, p. E2489.**

Proposes the establishment of a standing Committee on the Environment which would have jurisdiction over all environmental and pollution-related problems; says the proposed Joint Committee on Environment and Technology is only a "half step" solution to the urgent problems.

533. **Hickel, W. J., "A Civil War of Priorities",** *Congressional Record,* **v. 117, no. 67, 10 May 1971, pp. S6486-6488.**

Discusses the government's refereeing of the fight between the conservationists and those who would exploit our resources; stresses the importance of avoiding superficiality and selfish politics in the forthcoming 1972 world conference in Sweden on problems of the human environment; commends Nixon's request for the creation of a Department of Natural Resources, but urges that it be joined with EPA into The Department of Natural Resources and the Environment; dwells on problems of the cities.

534. **Rose, D. J., "The Case for National Environmental Laboratories",** *Technology Review,* **v. 73, no. 6, April 1971, pp. 39-47.**

Proposes the establishment of National Environmental Laboratories; discusses their missions, characteristics and functions, operating procedures, and tasks; an abridgement of a study used by Senators Muskie and Baker in sponsoring Senate Bill S.3410.

ENVIRONMENTAL LEGISLATION

535. **Petit-Clair, A. J., Jr., "Air Pollution Control: Political Solution or Equitable Resolution?",** *Congressional Record,* **v. 117, no. 74, 19 May 1971, pp. E4634-4640.**

Examines the problem of air pollution, the history behind legal attempts to control the pollution, and modern "legislated loopholes" in controls; designs a "model air pollution control act" which would be free of the "weaknesses inherent in present legislation"; describes legal methods of dealing with the individual polluter.

536. **"The Year of the Act",** *Environmental Education,* **v. 2, no. 3, Spring 1971, p. 49.**

The editor quotes from Public Law 91-516 to give the purpose of the Environmental Education Act; discusses furtherance of its objectives; lists ways in which the Journal is responding to the challenge and opportunity presented by the coming of age of environmental education.

537. **"Can the Third Arm Stop Pollution?",** *Technology Review,* **v. 73, no. 7, May 1971, pp. 68-69.**

Points out that citizens generally cannot stop polluters by taking them to court, because of the looseness of antipollution laws; discusses citizens' rights under common law and also proposed "private right of action" bills, under which any citizen can sue whenever he feels someone is polluting the environment; concludes that the law reflects our confusion about environmental goals, means, and costs.

538. **Billings, L. G., "Prospects for Environmental Legislation",** *Ecology Today,* **v. 1, no. 3, May 1971, pp. 37, 47-48.**

Reviews recent history and current activities in pollution-control legislation; Sen. Billings calls for new policies to recover resources now wasted; points out that aroused public opinion can result in tougher standards; emphasizes the need to recognize that the cost of pollution control must be borne by the public, not just by industry.

539. **"Joint Committee on the Environment",** *Congressional Record,* **v. 117, no. 36, 16 March 1971, pp. S3325-3326.**

Presents a resolution (S. J. Res. 17), passed by the Senate, to establish a joint congressional committee on the environment; its purpose is to study, review, and generate methods and policies of maintaining a livable earth for mankind and nature.

540. **"Nixon Admits Laws Still Vague",** *Chem 26,* **v. 7, no. 4, April 1971, pp. 36-37.**

Presents latest proposals by President Nixon to modify present standards of water-pollution control and paper recycling, suggesting that the Administrator of the Environmental Protection Agency be given broad powers to revise standards and restrict the use of substances which threaten the environment; calls for Federal and state purchasing policy review to increase the percentages of recycled paper required.

541. **Dingell, J. D., "Federal Water Pollution Control Act",** *Congressional Record,* **v. 117, no. 42, 24 March 1971, pp. H1966-1972.**

Introduces legislation providing for "comprehensive revision" of the Federal Water Pollution Control Act; calls for increasing the annual appropriation to state and interstate pollution-control agencies, and extends the water-quality-standards program and requirements; text of the proposed bill is included.

542. **Miller, S. S., "Congress: Much Ado About Water Pollution Amendments",** *Environmental Science & Technology,* **v. 5, no. 4, April 1971, pp. 302-303.**

Discusses problems before Congress in enacting new environmental legislation in the 1971 session; states that what is needed now in new water-pollution legislation is a combining of the two water laws – the Refuse Act of 1899 and the Federal Water Pollution Control Act – and clarification of the judicial test to be used in enforcing the law.

543. **Macdonald, T. H., "The Electric Power Supply and Environmental Protection Act",** *Congressional Record,* **v. 117, no. 45, 30 March 1971, pp. H2189-2190.**

Describes the Electric Power Supply and Environmental Protection Act which Rep. Macdonald was introducing – it provides for prompt arbitration of disputes concerning proposed powerplant and high-voltage transmission-line projects; includes recent newspaper articles which relate to electrical-power cutbacks.

544. **Dow, J. G., "Congressional Policy Statement Needed to Push Use of Recycled Materials in Fight to Clean Up the Environment",** *Congressional Record,* **v. 117, no. 64, 4 May 1971, pp. H3470-3472.**

Presents two bills: HR 8007 which authorizes and directs Federal purchase of paper with the greatest content of recycled material consistent with its purpose, and HR 8005 which establishes a Federal policy requiring "maximum use of recycled materials at all levels of procurement" and calls for detailed studies to define the products and materials to be regulated and to set standards for minimum recycled material content.

FACILITIES FOR R&D

545. **Yaffee, M. L., "AEDC Facilities Busy, Despite Cuts",** *Aviation Week & Space Technology,* **v. 94, no. 17, 26 April 1971, pp. 36-42.**

Describes the more significant programs of environmental testing of aerospace systems and components that are planned for the Arnold Engineering Development Center (AEDC), despite cuts in aerospace programs; tables list units and capabilities of the propulsion wind tunnel facility, the engine test facility, and von Karman gas dynamics facility.

546. **Percy, C. H., "Tribute to Dr. Robert R. Wilson and Progress at the National Accelerator Laboratory",** *Congressional Record,* **v. 117, no. 74, 19 May 1971, p. S7337.**

Praises the accomplishments of Dr. R. R. Wilson and his staff for being below the original cost estimates and ahead of the time schedule for building the National Accelerator Laboratory; describes efforts of Dr. Wilson to conserve the wildlife around the laboratory, provide equal-employment opportunities, and provide low-moderate income housing for the employees.

547. **Shapley, D., "Science Junk: Funding Cuts Make Used Equipment Pile Up",** *Science*, **v. 171, no. 3974, 5 March 1971, pp. 879-882.**

Discusses the extravagant Federal Disposal System and other programs which are now attempting to move used Government-owned scientific equipment back into the hands of the scientists; the programs are still a far cry from promoting Federal economy, which is the reason for their existence.

548. **Danilov, V. J., "The Research Park Shake-out",** *Industrial Research,* **v. 13, no. 5, May 1971, pp. 44-47.**

Discusses the subtle changes taking place in the makeup of modern successful science-oriented developments called research parks; gives current statistics on U.S. parks listed in the "Research Park Directory" and cites examples of both successful and unsuccessful parks.

FOREIGN AFFAIRS

549. **Rogers, W. P.,** *U.S. Foreign Policy in a Technological Age,* **Address before the 12th Meeting of the Panel on Science and Technology of the House Committee on Science and Astronautics on January 26, 1971, at Washington, D.C., 12 pp.** (For sale by the U.S. Government Printing Office, Washington, D.C., 20402. Price: 20 cents.)

States that our basic goal is to put science and technology at the service of human – and humane – ends; discusses the three major steps we are taking in our foreign policy to achieve this goal; these relate to aid to developing countries, protecting the world's environment, and international scientific and technological cooperation.

550. **Quimby, F. H.,** *The Politics of Global Health,* **Series on Science, Technology, and American Diplomacy, prepared for the Subcommittee on National Security Policy and Scientific Developments of the Committee on Foreign Affairs, U.S. House of Representatives May 1971, 79 pp.** (Available from Committee on Foreign Affairs, Room 2170 Rayburn House Office Building, U.S. House of Representatives, Washington, D.C. 20515.)

Examines the international political ramifications of world health agencies, particularly as they concern the U.S.; describes the structure and politics of the World Health Organization and discusses support of international health programs by agencies of the Departments of State, HEW, and Defense; describes international health activities of the U.S. Congress.

551. **"Interest Stirs in China/Science Contacts",** *Washington Science Trends,* **v. 26, no. 3, 26 April 1971, p. 14.**

Calls attention to interest among scholars and scientists in renewing contacts with counterparts in Mainland China, reflected in expressions of desire to invite Mainland Chinese representatives to international conferences in the U.S. and to exchange papers, reports, and scholars or scientists. For information, contact Committee on Scholarly Communication with the People's Republic of China, National Academy of Sciences, 2101 Constitution Ave., N.W., Washington, D.C. 20418.

552. **Boffey, P. M., "Technology and World Trade: Is There Cause for Alarm?"** *Science,* **v. 172, no. 3978, 2 April 1971, pp. 37-41.**

Discusses the fear by U.S. technology experts that the U.S. is in "danger of losing its preeminence in advanced technologies", primarily those important to world trade; looks at various analyses of U.S. influence in world trade – particularly that presented by analyst Michael T. Boretsky.

553. **McElheny, V., "Herbicides in Vietnam: Juggernaut Out of Control",** *Technology Review,* **v. 73, no. 5, March 1971, pp. 12-13.**

Reports on an $80,000 AAAS study of the impact upon Vietnamese plants and people of the massive U.S. herbicide-spraying program in Vietnam; shows that crop destruction has had no significant effect on enemy food supplies, while the program violates the Army's own rules against destruction of civilian food supplies.

FRANCE

554. **"France's R&D Plans",** *Chemical & Engineering News,* **v. 49, no. 21, 24 May 1971, p. 23.**

Points out that France's R&D spending will grow from 1.84% of its GNP in 1970 to 2.3% in 1975, while the number of French scientists engaged in R&D is expected to increase from 82,550 to 106,750, according to the sixth development plan (1971-75).

555. **"France: At the Crossroads",** *Nature,* **v. 231, no. 5300, 28 May 1971, pp. 229-230.**

Describes research priorities in France's Sixth Plan (1971-75) which provides for growth of research in the social and life sciences at the expense of growth of research in aerospace and atomic energy, with increased financing of R&D by industry.

556. **Budd, H., "A Foreigner's View of Research in France" (in French),** *La Recherche,* **v. 2, no. 11, April 1971, pp. 314-316.**

Consists of a question-and-answer interview of Herbert Budd, an American physicist from MIT studying in France, covering his views of French laboratories and teaching.

557. **"France Keys Growth to Civil Aircraft",** *Aviation Week & Space Technology,* **v. 94, no. 22, 31 May 1971, pp. 69-70.**

Describes steps toward one of the goals of France's current five-year financial plan (1971-75): to transform the aerospace industry into a self-supporting sector of the national economy; these include financing of industry's participation in international cooperation civil aircraft projects (Concorde, A-300B Airbus, and Dassault Mercure short-haul transport).

558. **Fink, D. E., "Pompidou Gives Concorde Support",** *Aviation Week & Space Technology,* **v. 94, no. 10, 17 May 1971, pp. 23-24.**

Describes the flight and reactions of French President Pompidou aboard the Concorde SST to show his strong support of the program; discusses resumption of the prototype flight test program.

559. **"Reorganisation of the Atomic Energy Commission",** *Science Policy News,* **v. 2, no. 5, March 1971, pp. 52-53.**

Describes the provisions of a September 1970 Decree, amending the 1945 Ordinance which set up the French Atomic Energy Commission (CEA), to bring the CEA's operation "into line with the present state of nuclear development".

560. **"Industrial Research as Seen by the CGE" (in French),** *La Recherche,* **v. 2, no. 12, May 1971, pp. 413-416.**

Presents a question-and-answer interview with Lucien Gobin, president of Marcoussis Laboratories, discussing changes in the R&D philosophy of one of France's largest industrial groups, the Compagnie Générale d'Électricité (CGE).

GOVERNMENT-SCIENCE INTERACTION

561. **Hersman, M. F., "Intergovernmental Science Programs: Federal Initiatives",** *SPPSG Newsletter,* **v. 2, no. 5, May 1971, pp. 3-5.**

Describes the NSF's program of grants to assist states, cities, and counties to apply scientific and technological analysis in meeting their obligations in such areas as health care, housing, transportation, public safety, and environment; discusses the Committee on Intergovernmental Science Relations.

562. **Fritschler, A. L., and Underwood, J. E., "Science-Technology Advice in Local Governments",** *Urban Data Service,* **International City Management Association, v. 2, no. 11, November 1970, 48 pp.** (Available from The University of the State of New York, The State Education Department, Albany, N.Y. 12224.)

Presents the results and conclusions of a 1970 survey of governments of cities of over 25,000 population concerning local government sources, needs, and personnel, for science-technology advice for the benefit of nonscientific officials who have to make decisions carrying scientific implications.

563. **Montoya, J. M., "The Department of Science and Technology Act of 1971",** *Congressional Record,* **v. 117, no. 32, 10 March 1971, pp. S2800-2812.**

Presents a bill which would establish a Department of Science and Technology, to develop a "national science plan" and to administer all of the R&D conducted by the Federal Government, absorbing the NSF, AEC, NASA, NBS, and the Smithsonian; includes an article detailing the history of efforts to create such a Department.

564. **Vickers, G.,** *Science and the Regulation of Society,* **One of a series of Occasional Papers/1970, The Institute for the Study of Science in Human Affairs, Columbia University, 56 pp.**

Assesses "the contribution which science has made and may make . . . for the government of human societies"; defines "policy science" and discusses such topics as the study of systems, the concept of order, modelling, prediction, and the future of policy science; lists seven principles for effective application of policy science to good government.

565. **Seidman, A., "Barriers to Technical Innovation",** *Bulletin of the Atomic Scientists,* **v. 27, no. 3, March 1971, pp. 29-31.**

Discusses an MIT conference to consider the application of science and technology to public programs; finds that the problems are as much social and political as technical, and that there are factors within government agencies which limit the participation of experts in decision making; presents recommendations for breaking down organizational barriers.

HUNGARY

566. **"Hungary: New Centre for Biologists",** *Nature,* **v. 231, no. 5300, 28 May 1971, p. 236.**

Describes a complex of laboratories presently under construction in Szeged, Hungary, to house four institutions specializing in biochemistry, biophysics, genetics, and plant physiology; foreign scientists will be encouraged to work at the Centre, to improve interchange with experimentalists from elsewhere.

INFORMATION MANAGEMENT

567. **Wakelin, J. H., Jr., "The National Stake in Better Technical Information", Remarks before the Forum on Management of Information Management Centers, 17 May 1971,** *U.S. Department of Commerce News,* **9 pp.** (Available from U.S. Dept. of Commerce, Office of the Secretary, Washington, D.C. 20230.)

Discusses the changing role of the information analysis center (IAC) in regard to the type of user served and the type of output required; outlines six major needs in information analysis, and cites three national problem areas: international voluntary standardization and certification, collection and dissemination of the burgeoning environmental literature, and coastal zone management.

568. *UNISIST – Synopsis of the Feasibility of a World Science Information System,* **by the United Nations Educational, Scientific and Cultural Organization and the International Council of Scientific Unions, Paris, Unesco, 1971, 92 pp.** (Available within limits of supply from Office of the Foreign Secretary, National Academy of Sciences, 2101 Constitution Ave., N.W., Washington, D.C. 20418.)

Gives results of a study of the Feasibility of a World Science Information System (UNISIST) by a joint Central Committee formed in 1967 by Unesco and the International Council of Scientific Unions (ICSU); the synopsis explains the background and objectives of UNISIST and presents 22 recommendations for implementing it; the full report is to be used as reference at the International Conference for the Establishment of a World Science Information System to be held in Paris from 4 to 9 October 1971. Full report is available from the Unesco Publications Center, Box 433, New York, N.Y. 10016. Price: $4.00.

569. **Dingell, J. D., "To Provide for a National Environmental Data System",**

Congressional Record, **v. 117, no. 72, 17 May 1971, pp. H3968-3973.**

Presents an amendment (Title III) to the National Environmental Policy Act of 1969 (P.L. 91-190) providing for the formation of a National Environmental Data System to serve as a "central national coordinating facility for the selection, storage, analysis, retrieval, and dissemination of information, knowledge, and data relating to the environment so as to provide information needed to support environmental decisions"; reports verbatim debate and House passage by 304 to 18.

INDIA

570. **"India: Conference of Scientists and Technologists",** *Science Policy News,* **v. 2, no. 5, March 1971, p. 57.**

Describes Prime Minister Indira Gandhi's challenge to scientists, technologists, and educators at a meeting last November to remedy bottlenecks in the implementation of the Science Policy Resolution of 1958; lists eight recommendations of the conferees in the areas of science policy, management of science, R&D organization, industrial development, higher education, and manpower.

571. **Strauss, H. L., "Science Education in India",** *Bulletin of the Atomic Scientists,* **v. 27, no. 3, March 1971, pp. 10-13.**

Sketches some of the problems of India, especially in technical education; describes the five Indian Institutes of Technology, at one of which the author taught for a year.

572. **Ronkin, R. R., "Indian Bioscience: Background for Improvement",** *BioScience,* **v. 21, no. 8, 15 April 1971, pp. 367-369, 374.**

Compares the Indian system of higher education with that in the U.S. and discusses the background of the U.S.-Indian conference on college and university bioscience in Bangalore, India, in June 1971.

ISRAEL

573. **"Science and Technology in Israel", Department of State Airgram No. A-448 from American Embassy, Tel Aviv, 28 November 1970, 4 pp.** (Available from U.S. Department of Commerce, Bureau of International Commerce, Washington, D.C. 20230.)

Discusses science and technology in Israel as factors in national security and in economic and social development; describes government organization for R&D, funding of R&D, scientific and technical manpower, Israeli technical aid to Arab countries, and the vast potential of Israel for growth of science and technology.

ITALY

574. **"Italy: Shortcomings in Scientific Research",** *Science Policy News,* **v. 2, no. 5, March 1971, pp. 57-58.**

Presents highlights from a report on R&D by the president of Italy's National Research Council (CNR) pointing out that the

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1969 and 1970 appropriations (0.9% of the GNP) are below the 1% considered a minimum, that university reform is overdue, that new legislation is badly needed to reform government research services, and that the legal status and salaries of all research-agency personnel should be governed by fair regulations; R&D expenditures are tabulated by years, sectors, and agencies.

JAPAN

575. *Summary of White Paper on Science and Technology — New Demands on Technical Innovation,* **Science and Technology Agency, Government of Japan, April 1971, 76 pp.**

Part I reviews technical innovation in Japan since the war, analyzes its role in technical progress and meeting society's needs, and suggests new directions to overcome problems; Part II deals with R&D expenditures, manpower, information activities, international exchanges, and patents; Part III presents measures taken in 1970 to promote science and technology in Japan.

576. **"Japan Pollution Program",** *Environment Report,* **v. 2, no. 1, 4 May 1971, p. 8.**

Presents information from a bulletin (*Japan Fights Environmental Pollution,* published by the Fuji Bank Ltd., Research Division, 1-5-5, Ote-machi, Chiyoda-ku, Tokyo, Japan) suggesting that Japan shift emphasis from economic growth and production to environmental preservation; mentions favorable-interest loans and tax concessions as pollution-control incentives to industry, which has been slow to act in spite of government-industry plans to spend $4.7 billion in 1975 for pollution control.

MANAGEMENT OF SCIENCE

577. **Hamilton, D., "Technological Philosopher",** *New Scientist and Science Journal,* **v. 50, no. 747, 15 April 1971, pp. 162-165.**

Interviews Dr. Harold M. Finniston, FRS, about the role of the administrative scientist and organized research; talks about scientific teams, the prime age of creativity, and social consequences of never-ending scientific advancement.

578. **Sharbaugh, H. R., " 'Unleash' The People",** *Vital Speeches of the Day,* **v. 37, no. 13, 15 April 1971, pp. 413-416.**

The President of Sun Oil Co. discusses the need for a change in the management of industry so as to utilize the "creativity of people" and to "encourage top performance" of the employee, to bring about "truly productive growth in an environment of continuing and accelerating change".

579. **Menke-Gluckert, P., "Mankind in the World of Tomorrow: the Changing Environment",** *Technological Forecasting and Social Change,* **v. 2, no. 3/4, 1971, pp. 231-235.**

Discusses the need for a "new type of systems management of complex social and economic systems"; assesses the "present value systems and methods of goal analysis in industrialized modern societies"; says that future research must "map out in advance any necessary changes in the present value system".

580. **Gell-Mann, M., "How Scientists Can Really Help",** *Physics Today,* **v. 24, no. 5, May 1971, pp. 23-25.**

Discusses the need for the scientific world to develop "humane rationality" through the application of systems analysis, the use of more science and technology, the application of this science and technology to social and environmental problems, communication with the public, and the continued attention to pure science.

581. **Wakelin, J. H., Jr., "Technological Horizons of Management Science", Lecture before the Institute of Management Sciences, Washington, D.C., 23 March 1971,** *United States Department of Commerce News,* **9 pp.**

The recently appointed Assistant Secretary of Commerce for Science and Technology discusses the important role which the management scientist plays in assisting the Government with its "most complex problems"; cites metrication, technology transfer, and environmental management as examples.

582. **Brooks, H., "Models for Science Planning",** *Public Administration Review,* **v. 31, no. 3, May/June 1971, pp. 363-374.**

Describes four models that might be used as partial bases for planning the support and development of science, and concludes that "it may be possible to develop tools by which the changing values and interests of society can influence the overall development of science with less direct intervention in individual scientific choices".

583. **Black, G.,** *What's Happening to Small Business Research and Development?,* **Staff Discussion Paper 303, Program of Policy Studies in Science and Technology, The George Washington University, May 1971, 13 pp.** (Available from National Technical Information Service, Springfield, Va. 22151. Price: $3.00.)

Points out that the programs of the few small manufacturing firms that perform any R&D are smaller relative to sales than those of large firms; suggests that this may be explained by trends in marketing and mass-media advertising, which make it increasingly difficult for small firms to reap rewards from their R&D, and by the fact that the bulk of the small businesses are in the service and trade industries where R&D performance has always been low.

584. **"Troubled Aerospace": (1) Samuelson, R. J., "Ailing Aerospace — Once-Fat Industry Struggles to Pull Out of Depression"; (2) Aarons, L. F., "Lockheed: Throes of an Aerospace Dinosaur"; (3) Carter, P. D., "Aircraft Employees: Engineering to Meter Reading. . .",** *Congressional Record,* **v. 117, no. 51, 14 April 1971, pp. S4790-4794.** (Reprinted from April 6 *Washington Post.*)

This is a "three-part analysis of the aerospace industry and the problems confronting it today"; deals extensively with the Lockheed Aircraft Corp.

MANPOWER, TECHNICAL AND SCIENTIFIC

585. **"Human Resources Board Established", News from the *National Research Council,* 2101 Constitution Ave., N.W., Washington, D.C. 20418, 29 March 1971, 3 pp.**

Describes the ten-member Human Resources Board just established by the National Research Council; supported in part by a $50,000 annual grant from the Russell Sage Foundation, the board will make a broad survey of national education and manpower problems and select specific areas for in-depth study.

586. **"Employment Problems Seen Increasing", *Washington Science Trends,* v. 26, no. 5, 10 May 1971, pp. 25-26.**

Calls attention to warnings of "mass unemployment" issued by the Labor Department, reinforced by separate findings and predictions announced by the Aerospace Industries Association, the American Chemical Society, and George Washington University; tempers the gloomy picture with some hopeful signs.

587. **Lovell, M. R., Jr., "Remarks by Malcolm R. Lovell, Jr., Assistant Secretary of Labor for Manpower, Before the Conference on Employment Problems of Scientists and Engineers in the Aerospace and Defense Industries", *Congressional Record,* v. 117, no. 31, 9 March 1971, pp. S2713-2715.**

Discusses unemployment problems generated by R&D budget cuts; discusses the results of a survey of scientist and engineer unemployment in 24 cities hardest hit; expects a big future demand for trained engineers, but of a "quite different" type.

588. **"Engineering Idleness Reaches Postwar High", *Product Engineering,* v. 42, no. 5, 1 March 1971, p. 15.**

Quotes the AFL-CIO Council for Scientific Professional & Cultural Employees in calling the current recession "a crisis for professionals"; gives a few statistics on unemployment rates.

589. **Cartter, A. M., "Scientific Manpower for 1970-1985", *Science,* v. 172, no. 3979, 9 April 1971, pp. 132-140.**

Utilizes tables and graphs to back up a discussion of the excess suply of Ph.D.'s in the U.S.; discusses actions to be taken by professional associations, colleges and universities, and the government to avoid predicted manpower troubles in the 1980's.

590. **"Job Shortage Hits Older Physicists Hardest", *Physics Today,* v. 24, no. 5, May 1971, pp. 61-63.**

Presents findings of the American Physical Society Economic Concerns Committee indicating that "the main burden of the present unemployment crisis is being borne by the more experienced physicist, not the more visible new Ph.D.'s". (A report on the findings may be obtained from Dr. Lee Grodzins, Massachusetts Institute of Technology, Cambridge, Mass. 02139.)

591. **Shapley, D., "Route 128: Jobless in a Dilemma about Politics, Their Professions", *Science,* v. 172, no. 3988, 11 June 1971, pp. 1116-1118.**

Describes the hard times being experienced by older professional scientists who are now unemployed, and depicts their political and professional feelings.

592. **Rudoff, A., and Lucken, D., "The Engineer and His Work: A Sociological Perspective",** *Science,* **v. 172, no. 3988, 11 June 1971, pp. 1103-1108.**

Assesses some sociological characteristics of the laid-off engineer and some sociological concepts related to the engineering profession; makes use of the 1967 study by Loomba of the experiences of scientists and engineers laid off between 1963 and 1965.

593. **Liebmann, S., "Gloom in U.S. High Technology",** *New Scientist and Science Journal,* **v. 50, no. 752, 20 May 1971, pp. 449-450.**

Describes the worsening employment crisis in most technologies, indicating that the recession is "almost totally political in origin"; outlines some consequences, such as the expected decrease in number and worth of Ph.D. degrees and strings on venture capital.

594. *1969 and 1980 Science and Engineering Doctorate Supply & Utilization,* **National Science Foundation Report NSF-71-20, June 1971.** (Available from U.S. Government Printing Office, Washington, D.C. 20402. Price: 50 cents.)

Presents projections indicating that there will be as many as 40% more Ph.D. scientists and engineers than needed in 1980, contrary to earlier forecasts, assuming that recent training trends continue and there is no change in the economy.

595. **"Aerospace Employment",** *Aerospace News,* **Aerospace Industries Association of America, Inc., 1725 DeSales St., Washington, D.C. 20036, P.A. Release No. 71-10, 5 May 1971, 15 pp.**

Describes the employment decline in the Aerospace Industry; presents the Aerospace Industries Association's semiannual employment survey of 43 companies showing employment of technicians, scientists and engineers, and production workers by year, geographic area, and product group, in the form of a graph and 20 tables.

596. **Shapley, D., "Job Prospects: Science Graduates Face Worst Year in Two Decades",** *Science,* **v. 172, no. 3985, 21 May 1971, pp. 823-824.**

Discusses the gloomy unemployment and underemployment situation for 1971 science and technology graduates, with particular emphasis on degree candidates in physics, chemistry, and earth sciences.

597. **"Grim Job Outlook for Class of 1971",** *Chemical & Engineering News,* **v. 49, no. 15, 12 April 1971, pp. 16-17.**

Describes the poor overall job outlook for college graduates, particularly Ph.D.'s, in the fields of chemistry and chemical engineering; figures are given to show the reductions in recruiting and hiring by many companies, and how this is affecting starting salaries, university enrollments, and faculty positions.

598. **"Jobless Funds for 14 Cities",** *Science News,* **v. 99, no. 16, 17 April 1971, p. 264.**

Describes recent bills and programs proposed by the Administration and Congress to retrain and loan money to the 75,000 to

100,000 unemployed scientists and engineers; gives preliminary survey results showing that of 2000 aerospace workers laid off from 1968 to 1970, only 31% have found permanent jobs and 32% are still unemployed.

599. **Gooding, J., "The Engineers Are Redesigning Their Own Profession",** ***Fortune,*** **v. 83, no. 6, June 1971, pp. 72, 74-75, 142, 144, 146.**

Describes the unemployment problem and measures by Federal agencies, state governments, and engineering societies to retrain unemployed scientists and engineers; discusses what is being done by engineering schools to avoid the "serious problem of early obsolescence" of their graduates.

600. **"White House Finds $42m to Help Jobless Technologists",** ***Physics Today,*** **v. 24, no. 5, May 1971, p. 61.**

Describes a $42 million program to find jobs and help retrain unemployed scientists and technicians, to be administered by the Department of Labor's Manpower Division; the retraining programs will direct the engineers and scientists into fields dealing with the environment, urban problems, health, and safety engineering.

601. **"More Effort Aids Jobless",** ***Chemical & Engineering News,*** **v. 49, no. 15, 12 April 1971, pp. 11-12.**

Outlines President Nixon's $42 million program to reemploy jobless scientists and engineers, and plans of the new Manpower Institute, a nonprofit organization headed by former Secretary of Labor Willard Wirtz, to identify manpower imbalances and implement programs to correct them.

602. **"Administration Details Science Employment Program",** ***Washington Science Trends,*** **v. 26, no. 7, pp. 37-39.**

Describes plans for implementing the $42-million Technology Mobilization and Reemployment Program to provide job promotion efforts, job search grants, on-the-job training and short-term academic courses, and skill-conversion studies for an estimated 30,000 unemployed scientists, engineers, and technicians in 14 target areas in 11 states (details available from Technology Mobilization and Reemployment Program, Manpower Administration, Room 2307, Department of Labor, Washington D.C. 20210).

603. **"Federal Aid Program Offers Few Jobs",** ***Aviation Week & Space Technology,*** **v. 94, no. 23, 7 June 1971, p. 64.**

Gives addresses of state offices where applicants can register for grants under the Nixon Administration's program to aid scientists, engineers, and technicians who have lost jobs in defense or aerospace-oriented fields; states that the program is turning up few jobs.

604. **Graber, R. C., Erickson, F. K., and Parsons, W. B., "Manpower for Environmental Protection",** ***Environmental Science & Technology,*** **v. 5, no. 4, April 1971, pp. 314-319.**

Lists types and activities of professionals involved in environmental protection; by 1980, needs for environmental professionals should triple and paraprofessional manpower needs should double; discusses education and training; lists academic institutions offering environmental protection graduate programs in 1970.

605. **Fanning, O.,** *Opportunities in Environmental Careers,* **VGM Special Career Volume, Vocational Guidance Manuals, 235 E. 45th St., New York, N.Y. 10017, 1971 ($5.75).**

Covers jobs in ecology, earth sciences, resources and recreation, environmental design, and environmental protection; describes scope of each field, defines terms, lists major activities, discusses functions of specific types of practitioners, pegs the practice on the career ladder, describes education, identifies 175 leading colleges, generalizes earnings and working conditions, projects employment demand to 1980, and lists sources of additional information.

606. **Baram, M. S., and Barney, G. O., "Manpower for Environmental Action: A Proposal",** *Technology Review,* **v. 73, no. 7, May 1971, pp. 49-52.**

Discusses the requirement of the National Environmental Policy Act (NEPA) for all "major federal actions" to be assessed as to environmental impact; NEPA calls for the use of "interdisciplinary assessment teams" to examine the major actions objectively; blames the lack of successful implementation on the shortage of skilled environmentalists and suggests that the manpower for objective assessment could be obtained from unemployed scientists and engineers.

607. **Mottur, E. R.,** *Conversion of Economic and Technical Resources: Economic Challenge – Social Opportunity,* **Program of Policy Studies in Science and Technology, The George Washington University, Washington, D.C., Monograph No. 8 (GWPS-Mon 8), March 1971, 201 pp.** (Available from National Technical Information Service, Springfield, Va. 22151. Price: $3.00.)

Describes the economic challenge and social opportunity presented by the conversion of U.S. scientific and technical resources from defense to civilian objectives; delineates requirements which must be met to achieve conversion, appraises existing programs and proposals, and presents 26 policy recommendations for a successful national conversion program.

608. **Kennedy, E. M., "Statement of Senator Edward M. Kennedy on Reemploying Defense Scientists and Engineers",** *Bulletin of the Atomic Scientists,* **v. 27, no. 3, March 1971, pp. 41-43.**

Discusses the unemployment of scientists and engineers stemming from cutbacks in Government spending; recommends adding $10 million to NSF's budget immediately, to be used for planning and R&D on conversion to civilian-oriented projects.

609. **"Unemployed Engineers + Problems = Retraining, Many Experts Say",** *Product Engineering,* **v. 42, no. 5, 1 March 1971, p. 15.**

From several sources, including John R. Kiely, acting president of the Engineers Joint Council, the North Jersey section of ASME, and a group of senators, have come suggestions and plans for retraining unemployed engineers to do work that needs to be done.

610. **"Loans for Out-of-Work Scientists Proposed",** *Physics Today,* **v. 24, no. 5, May 1971, pp. 61, 64.**

Describes a bill introduced on 16 March 1971 to supplement the proposed Conversion Research and Education Bill of 1971; the new bill, to be administered by the NSF, provides unemployed scientists and engineers with long-term guaranteed loans to tide them over the unemployment period.

611. **McCurdy, P. P., "Orchestrating Our National Efforts",** *Chemical & Engineering News,* **v. 49, no. 15, 12 April 1971, p. 13.**

Criticizes the proposal of Rep. Henry S. Reuss' Conservation and National Resources Subcommittee asking for government subsidy of unemployed aerospace scientists and engineers to work in the water-pollution-control industry; contends that this would be inefficient and unfair to existing companies in the pollution-control field.

612. **"Cities Can Now Tap the Aerospace Manpower Pool",** *Nation's Cities,* **v. 9, no. 6, June 1971, pp. 21, 45.**

Describes the efforts of the National League of Cities and the U.S. Conference of Mayors in cooperation with Federal departments to place unemployed qualified scientists and engineers in local government jobs around the country; describes a four-week orientation program for the participants to give them insight into local government.

613. **"Water-Resources Manpower: Supply and Demand Patterns to 1980", 48 pp.** (Available from Bookstore, Louisiana State University, Baton Rouge, La. 70803. Price: $2.00.)

Presents supply-demand patterns and projections regarding water-resources manpower in the U.S.; supply is projected to reach 154,000 by 1980 with about 55,000 engaged in research, while demand is projected at 267,000 with 95,000 needed for research.

614. **"Immigrant Scientists, Engineers, and Physicians Increase in FY 1970",** *Science Resources Studies Highlights,* **National Science Foundation, Washington, D.C. 20550, 22 April 1971, Report NSF 71-11, 4 pp.**

Points out that in FY 1970 the 13,300 immigrant scientists and engineers was the largest number admitted to the U.S. in 20 years, and that this year the U.S. Department of Labor has tightened the certification rules for immigrant scientists and engineers; presents statistical data on origin, occupational distribution, and the state of intended residence of the immigrant scientists, engineers, physicians, and surgeons for FY 1969 and 1970.

615. **Psacharopoulos, G., "On Some Positive Aspects of the Economics of the Brain Drain",** *Minerva,* **v. 9, no. 2, April 1971, pp. 231-242.**

Examines the significance of economic factors in determining the emigration of high level manpower to the U.S.; presents a mathematical analysis of the relations between emigration flow of university graduates, employment, educational investment, and the gross rate of return on the investment.

616. **"Salaries and Selected Characteristics of U.S. Scientists, 1970",** *Reviews of Data on Science Resources,* **no. 19, National Science Foundation Report NSF 70-50, December 1970, 8 pp.** (Available from the U.S. Government Printing Office, Washington, D.C. 20402. Price: 10 cents.)

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Analyzes data based on the 1970 National Register of Science and Technical Personnel, which includes numbers and median salaries of scientists in the major science fields, by highest degree attained, employment status, type of employer, and primary work activity; also gives the number of scientists reporting Federal support of some of their work, and the distribution by state and science field.

617. *Report on 1970 National Survey of Compensation Paid Scientists and Engineers Engaged in Research and Development Activities*, **Battelle, Columbus Laboratories, 1 November 1970 (published 1971), 256 pp.** (Available from U.S. Government Printing Office, Washington, D.C. 20402. Price: $2.00.)

Reports results of third annual survey, relating salaries to years since receipt of degree, in the form of voluminous charts and tables; parameters include college degree, level of employment, sex, field of degree, type of establishment, and occupation.

MULTINATIONAL SCIENCE ACTIVITIES

618. *WAITRO – World Association of Industrial and Technological Research Organizations*, **results of the Meeting of the Founding Members held in Vienna from 28 to 30 October 1970.** (Available from P. C. Trussel, Director of British Columbia Research, Vancouver 8, B.C., Canada, or United Nations Industrial Development Organization, P.O. Box 707, A-1011, Vienna, Austria.)

Gives the Constitution, By-Laws, and Tentative Work Program for 1971 for WAITRO; its purpose is to initiate exchanges of information concerning industrial research on an international or regional scale.

619. **Skolnikoff, E. B., "Technology and the Future Growth of International Organizations",** *Technology Review*, **v. 73, no. 8, June 1971, pp. 39-47.**

Presents "a partial survey of developments in technology and their side effects over the next 10 to 20 years, for the purpose of laying out the international political functions that each technical prospect implies"; deals with three broad topics – environment alteration, ocean resources, and outer space.

620. **"UNESCO: Pattern for UN University",** *Science Policy News*, **v. 2, no. 5, March 1971, p. 63.**

Describes a plan for establishing a United Nations University, as presented by Prof. A. Salam, Pakistani physicist who heads the International Center for Theoretical Physics at Trieste; suggests that a worldwide federation of centers would facilitate international exchanges of scientists and collaboration among countries with conflicting political views.

621. *UNITAR News*, **a periodical published by the United Nations Institute for Training and Research.** (For information, write to Christina McDougall, United Nations Institute for Training and Research, 801 U.N. Plaza, New York, N.Y. 10017.)

Contains notices of international meetings, seminars, workshops, colloquia, and training courses involving the U.N.; presents highlights of past meetings, reprints of key lectures, and announcements of available and forthcoming UNITAR publications.

622. **"NATO Programs Support Scientific Research",** *Chemical & Engineering News,* **v. 49, no. 19, 10 May 1971, pp. 50-52.**

Discusses NATO's research programs and budget ($4 to 5 million annually) to promote international cooperative research among its 15 member nations; funds are used for fellowships (to bolster visits of scientists among member countries), advanced study institutes, and direct grants for specific studies.

623. *International Science Policy,* **Panel on Science and Technology, Twelfth Meeting, Proceedings before the Committee on Science and Astronautics, U.S. House of Representatives, 92nd Congress, First Session, 26-28 January 1971, [No. 1], 373 pp.** (Available from U.S. House of Representatives, Committee on Science and Astronautics, Washington, D.C. 20515.)

Contains biographies of participants and transcripts of remarks by 20 distinguished individuals from the U.S. and abroad, plus ensuing discussions; major talks cover international cooperation in the environmental, physical, social, and life sciences, and such topics as the developing countries, legislative role in science policy, mechanisms for cooperation, and arms control.

624. *International Science Policy,* **a Compilation of Papers Prepared for the 12th Meeting of the Panel on Science and Technology, Committee on Science and Astronautics, U.S. House of Representatives, February 1971, 166 pp.** (Available from U.S. Government Printing Office, Washington, D.C. 20402. Price: 75 cents.)

Reprints the Keynote address by Secretary of State Rogers, remarks by UNESCO's Assistant Director-General for Science (the moderator), the 12 major papers presented at the meeting, and summary views and comments by the director of the Department of State's Bureau of International Scientific and Technological Affairs; see Ref. 623 for complete Proceedings.

625. **Brown, H., "Some Thoughts on the National Academy of Sciences and the Role of Nongovernmental Institutions",** *Congressional Record,* **v. 117, no. 75, 20 May 1971, pp. E4751-4755.**

Presents examples and discusses problems of current international cooperation in space and science; discusses future areas of international scientific effort, exchange programs between the NAS and Soviet and European academies, and scientific programs in developing countries.

626. **"Twelfth Pacific Science Congress",** *Science Policy News,* **v. 2, no. 5, March 1971, p. 52.**

Announces a meeting of the 50-year-old Pacific Science Association in Camberra, Australia, on 18 August to 3 September 1971, with a four-topic agenda: Productivity and Conservation in the Pacific, Man in the Pacific, Environmental Quality and Resource Management, and Geological Structure and Mineral Resources in the Pacific Area.

627. *Science Policy and the European States,* **Science Policy Studies and Documents, No. 25, Unesco, 1970, 208 pp.** (Available from Unesco Publications Center, P.O. Box 433, New York, N.Y. 10016 and other

distributors throughout the world. Price: $3.00.)

Reports on the conference of ministers responsible for the science policy of the European Member States of Unesco in June 1970; Part I describes the conference and presents general conclusions and recommendations, as well as specific ones under each of four headings: manpower, priorities and goals, national aspects of basic research, and European cooperation in basic research; Part II (160 pages) reproduces a document in four chapters (same subjects) prepared beforehand by the Unesco Secretariat as a basis for discussions.

628. **Jahsman, W. H., "Toward a European Scientific Power",** ***Technology Review*****, v. 73, no. 8, June 1971, pp. 10-12.**

Discusses the trend toward cooperation on engineering and scientific projects and toward formation of inter-European-national professional societies; cites examples.

629. **"Policy for European Science",** ***Nature*****, v. 231, no. 5300, 28 May 1971, pp. 221-224.**

Considers how the admission of the United Kingdom and its associates to the European Economic Community will transform the European technical community and how the potential of the European community for scientific research and technical development can be most fruitfully exploited.

630. **"PREST Depressed",** ***Nature*****, v. 230, no. 5291, 26 March 1971, p. 200.**

Reports that few of the ambitious proposals for European collaboration in research put forward 2 years ago by the European Community's Scientific and Technical Research Policy group (PREST) will be put into effect; discusses the obstacles to agreement and also mentions a future meeting of the ministers of education to discuss the exchange of scientists.

631. **"European Technology in Disarray",** ***Nature*****, v. 230, no. 5291, 26 March 1971, p. 198-199.**

Gives reasons for the failure of plans for collaborative projects within the European Economic Community in fields such as telecommunications, large computers, and control of pollution; advises that technical collaboration in Europe is largely a matter of political and social engineering.

632. **"Signs of Change in Euratom",** ***Nature*****, v. 231, no. 5300, 28 May 1971, pp. 233-234.**

Discusses the "bureaucratic reorganization" within the six-nation Euratom organization, precipitated by its failure to develop a "unified European nuclear policy".

633. **"New Lease of Life",** ***Nature*****, v. 231, no. 5300, 28 May 1971, pp. 230-232.**

Reviews the background and status of the 300 GeV particle accelerator to be built on the Swiss-French border by the European Organization for Nuclear Research (CERN), following 7 years of "off-again, on-again" planning; describes the capabilities and adaptabilities of the CERN accelerator and its probable effect on the budgets and operations of the national high-energy laboratories in CERN's member nations.

634. **Smith, P. J., "March of the 300", *New Statesman,* 26 March 1971, pp. 414, 416.**

Presents a detailed review pointing to the conclusion that England's decision to back the multinational 300 GeV CERN (European Council for Nuclear Research) accelerator project at long last, was the result of a "sophisticated political campaign" by the British nuclear physics community – a campaign "notable for its contempt of the press, public, politicians and the vast majority of scientists".

635. **Sims, G., and Bright, W., "A New Alliance in Science?", *New Scientist and Science Journal,* v. 50, no. 754, 3 June 1971, pp. 579-582.**

The authors believe that an improvement in Anglo-French collaboration in research is long overdue and that now is a propitious time for collaboration in university scientific research because both countries appear to be converging towards a similar deployment of their efforts; they suggest ways of making active contacts.

636. **MacRae, D. A., "A Telescope for Canada in the Mountains of Chile", *Science Forum,* v. 4, no. 2, April 1971, pp. 18-20.**

Describes the 24-inch telescope facility being installed by the David Dunlap Observatory of the University of Toronto at the Carnegie Institution's Las Campanas Observatory in north-central Chile; discusses the operating agreements of Dunlap with the Carnegie Institution of Washington and the University of Chile; describes other international astronomy facilities in Chile.

637. **Sherwood, M., "QSEs at Home and Away", *New Scientist and Science Journal,* v. 50, no. 752, 20 May 1971, pp. 437-438.**

Describes the crisis existing due to the excess of qualified scientists and engineers (QSE's) in various countries; discusses employment and international migration of QSE's in Britain, Germany, Italy, Netherlands, France, Norway, Denmark, and Sweden, with the most optimistic picture coming from the last three countries.

638. **Greenwood, J. W., "The Science Attaché: Who He Is and What He Does", *Science Forum,* v. 4, no. 2, April 1971, pp. 21-25.**

Discusses in some detail the activities of science attachés in embassies around the world, based on replies to a questionnaire in a 1969-70 survey; a sequel to an earlier article on scientist diplomats [*SPR*,4 (1): Ref. 168].

NATIONAL DEFENSE

639. **Lederberg, J., "Biological Warfare: A Global Threat", *American Scientist,* v. 59, no. 2, March-April 1971, pp. 195-197.**

Discusses the implications of recent developments in biochemistry that might be used to evolve new and more terrible biological warfare techniques; describes some diseases that could be used for BW; advocates international cooperation in beneficial microbiological research as an adjunct to banning BW research; touches briefly on the Geneva Protocol and chemical warfare.

640. **"Geneva Protocol: Better to Defer Its Ratification, If Necessary, Than to Approve Administration 'Understandings' "**, *Congressional Record,* **v. 117, no. 45, 30 March 1971, pp. E2481-2482.**

Gives a statement by the Federation of American Scientists opposing ratification of the Geneva Protocol until the Vietnam war is concluded, so that there will no longer be any justification for the Administration's "understandings" that irritant chemicals and herbicides are not to be included.

641. **Nelson, G., "Herbicides and the Geneva Protocol",** *Congressional Record,* **v. 117, no. 42, 24 March 1971, pp. S3797-3800.**

Pleads for prompt Senate ratification of the Geneva Protocol banning chemical and biological warfare, provided the Administration includes the banning of the use of herbicides; discusses the history and consequences of U.S. use of herbicides in Vietnam.

642. **"Soviet Support for Ban on Germ Warfare",** *Science News,* **v. 99, no. 15, 10 April 1971, p. 245.**

Reports announcement by the Soviets that they would support a treaty to ban germ warfare – a change from previous Soviet insistence on considering germ and chemical warfare bans together; the Senate has tabled approval of the Geneva Protocol, pending further study of whether or not the use of herbicides, theoretically nonlethal CS gas, and "riot control agents" should be considered chemical warfare.

643. **Hosmer, C., "Comparative U.S./U.S.S.R. Management of Defense R. & D.",** *Congressional Record,* **v. 117, no. 44, 29 March 1971, pp. E2368-2369.**

Compares the Soviet development policy of "rigid state plans" to the U.S. "supply and demand" system; suggests defining the U.S. margin of security by "net technical assessment"; this process compares the input of money, manpower, etc., and output of technological progress in both countries, and can be used to ascertain the most needed weapon-system development.

644. **"Is There an R. & D. Gap?",** *Congressional Record,* **v. 117, no. 67, 10 May 1971, pp. S6517-6525.**

Presents the Report of the Ad Hoc Committee on Military R&D, Federation of American Scientists, supporting a vigorous R&D program "on those weapons that are necessary to maintain a deterrent of unquestioned power"; criticizes Dr. John Foster, Director of Defense Research and Engineering for his "selective disclosure, questionable assumptions, exaggeratedly precise estimates, misleading language, and alarmist nonsequiteur conclusions" relative to the technology race between the U.S. and the USSR.

645. **Possony, S., and Pournell, J., "The Technological War",** *Congressional Record,* **v. 117, no. 78, 25 May 1971, pp. E5012-5016.** (Reprint of Chapter 1 of their book entitled, "The Strategy of Technology: Winning The Decisive War".)

Sets forth some of the essential elements which determine the outcome of the struggle for technological superiority; claims that we must understand this form of conflict in order to prevent Soviet victory at the crucial technological level.

646. **Mikulak, R., *A Second Look at U.S. and Soviet Research and Development,* Report B/71-1, February 1971, 35 pp.** (Available from Center for International Studies, E53-470, Massachusetts Institute of Technology, Cambridge, Mass. 02139. Price: $1.00.)

Looks into the statement by Dr. John S. Foster, Director of Defense Research and Engineering, that "Russia will overtake the United States in R&D effort in the next few years"; presents tables and graphs to substantiate the fact that the U.S. is still significantly ahead of Russia in R&D; liberally documented.

647. **"Defense R&D on Campus", *Chemical & Engineering News,* v. 49, no. 17, 26 April 1971, pp. 7-8.**

Describes expected changes in the University of California's attitude toward continuing the development of nuclear weaponry at the Lawrence Radiation Laboratory and Los Alamos, stemming partially from faculty and student concern over classified research in university-operated facilities.

648. **Ruzic, N. P., "Wage Peace", *Industrial Research,* v. 13, no. 3, March 1971, pp. 45-52.**

Discusses scientific and social research related to peace and proposes a "radical solution" to the problem of war: retain the "syndromes of a martial society", but change the primary mission of the military from "destruction to construction", with the U.S. taking the lead.

NETHERLANDS

649. **"Netherlands: Structure of the Government Organization for Science and Technology", *Science Policy News,* v. 2, no. 5, March 1971, pp. 58-62.**

Presents highlights of an Advisory Report prepared by the Science Policy Council of the Netherlands; the major recommendation is that a Secretary of State for national science policy, attached to the Ministry of Education and Science, be charged with the political responsibility for national science policy in accordance with a list of specified duties.

NORWAY

650. **"Norwegian Science Policy", *The OECD Observer,* no. 50, February 1971, pp. 27-31.**

Reviews the findings of a U.S. and a Netherlands scientist-examiner for the OECD, who have studied the steps Norway has taken to bring its science policies more into line with the country's needs; includes details of Norway's government-science structure.

OCEAN – INTERNATIONAL ACTIVITIES

651. **"Nations Seek Agreement on Sea Bed Rights", *Chemical & Engineering News,* v. 49, no. 12, 22 March 1971, pp. 26-27.**

Gives some reactions to President Nixon's proposals dealing with the control and exploitation of mineral resources and sea-bed oil on the international scale; lists Nixon's six principles of such control; presents background details on jurisdictions.

652. **Jennings, F. D., "International Decade of Ocean Exploration",** *Congressional Record,* **v. 117, no. 31, 9 March 1971, pp. S2703-2704.**

Gives a concise description of NSF's International Decade of Ocean Exploration; discusses its 6 goals and 3 main operating tenets; a presentation by the head of the IDOE to the American Oceanic Organization.

OCEAN – POLLUTION

653. **Cathers, L. D., "Ocean Dumping: Challenges of Broadest Social Import",** *Astronautics & Aeronautics,* **v. 9, no. 4, April 1971, pp. 20-21.**

Discusses the report, "Ocean Dumping, A National Policy", prepared by CEQ; urges that the nation act promptly; suggests that aerospace technology might prove useful in controlling ocean dumping.

654. **Roth, W. V., Jr., "International Conference on Ocean Dumping",** *Congressional Record,* **v. 117, no. 47, 1 April 1971, pp. S4383-4386.**

Includes a letter by Senator Roth to President Nixon suggesting that the U.S. convene an international conference to deal with ocean dumping, as well as a copy of the President's reply; outlines the major problems of the marine environment and briefly describes the activities of major international organizations in the field.

655. **Beall, J. G., Jr., "Ocean Dumping",** *Congressional Record,* **v. 117, no. 48, 5 April 1971, pp. S4607-4608.**

Includes Senator Beall's testimony before the Subcommittee on Air and Water Pollution of the Senate Public Works Committee as a cosponsor of the Marine Protection Act of 1971 (S. 1238) to require a permit for discharging of waste into the oceans.

656. **"Remarks by the Honorable Russell E. Train, Chairman, Council on Environmental Quality, Before the 16th Annual Tanker Conference of the American Petroleum Institute, Ponte Vedra Beach, Fla., May 10, 1971",** *Congressional Record,* **v. 117, no. 72, 17 May 1971, p. H4019.**

Reports that the U.S. is taking the lead not only in national regulation of oil transport, but in obtaining major international agreements to accept the recommendations of the NATO Oil Spills Conference to ban oil discharges into the oceans by 1975, if possible, and no later than 1980.

OCEAN – U.S. ACTIVITIES

657. **"National Oceanic Act of 1971",** *Congressional Record,* **v. 117, no. 83, 3 June 1971, pp. S8086-8089.**

Senator Ernest F. Hollings discusses the urgent necessity of a comprehensive and well-funded oceans program for the U.S. and reintroduces the National Oceanic Act of 1971 with corrected statistics, as S. 1986; includes a table showing how appropriations to the departments and agencies concerned might be spent through FY 1976.

PANAMA CANAL

658. *Interoceanic Canal Studies 1970,* **Report of the Atlantic-Pacific Interoceanic Canal Study Commission, 1 December 1970, 1000 pp.** (Available from Department of the Army, Office of the Under Secretary, Washington, D.C. 20310.)

Text discusses Isthmian canal interests, potential traffic and revenues, nuclear excavation, general criteria, environmental considerations, alternatives, financial feasibility, management, and conclusions; annexes cover foreign policy, national defense, finance, shipping, and engineering feasibility; recommends construction of sea-level canal by conventional excavation after negotiating a suitable treaty with Panama, and provision for continuing research on environmental effects.

659. **Thurmond, S., "The Smithsonian Symposium on Ecological Hazards of a Sea Level Canal at Panama",** *Congressional Record,* **v. 117, no. 42, 24 March 1971, pp. S3879-3880.**

Argues against proposals by the Atlantic-Pacific Interoceanic Canal Study Commission to build a sea-level canal in Panama (see Ref. 658); presents the agenda of a March 4 symposium to discuss the state of biological knowledge of the Panamic region, at which the presentations "were clearly and overwhelmingly against the sea level project because of ecological considerations"; a March 5 *Washington Post* article that summarizes the ecological hazards is included.

PERSONALITIES

660. **Shepherd, J., "Introducing William Ruckelshaus – Who?",** *Congressional Record,* **v. 117, no. 57, 23 April 1971, pp. S5516-5517.** (Reprinted from *Look*, 4 May 1971.)

Presents a biographical description of the first administrator of the Environmental Protection Agency, who has been charged with the job of being "the Nation's top antipollution cop".

661. **"Major NOAA Appointments Announced",** *U.S. Department of Commerce News,* **Office of the Secretary, Washington, D.C. 20230, 11 May 1971, 2 pp.**

Announces two major appointments in the National Oceanic and Atmospheric Administration: David H. Wallace as Associate Administrator for Ocean Resource Management, and Dr. William Aron as Director of the Office of Ecology and Environmental Conservation; biosketches are included.

662. *News Release, National Center for Solid Waste Disposal, Inc.,* **1211 Connecticut Ave., N.W., Washington, D.C. 20036, 31 May 1971, 3 pp.**

Gives backgrounds of Dr. James G. Abert, former Deputy Assistant

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Secretary of HEW, and Wade St. Clair, former Director of Public Services for NASA, who were named directors of Research and Information, respectively, in the National Center for Solid Waste Disposal, Inc., a nonprofit technological center seeking answers to the nation's municipal waste problems.

POLAND

663. **"Poland: Where Science Stands Now", *Nature*, v. 231, no. 5300, 28 May 1971, pp. 226-227.**

Discusses advances in Polish science since the Second World War; names laboratories, institutes, and societies responsible for research activity in various fields, including mathematics, physics, nuclear physics, astronomy, chemistry, and others; also discusses international collaboration.

POLICY MAKING BODIES

664. ***Organization and Members, 1970-1971*, National Academy of Sciences, National Academy of Engineering, National Research Council, November 1970, 243 pp.** (Available from Printing and Publications Office, National Academy of Sciences, 2101 Constitution Ave., N.W., Washington, D.C. 20418.)

Contains general information about the Academies and Council, officers and members of each, Committee functions and membership, Division and Office descriptions and membership, and liaison personnel with other organizations; indexed.

665. **Cohn, V., "The 'House of Lords' of Science", *Technology Review*, v. 73, no. 8, June 1971, pp. 8-9.**

Describes the National Academy of Sciences and some of its projects; reports that an investigation of the Academy's roles is being conducted by Philip M. Boffey; includes remarks by Dr. Philip Handler on the accomplishments and goals of the Academy.

666. **Barfield, C. E., "Science Report/National Academy of Sciences Tackles Sensitive Policy Questions", *Congressional Record*, v. 117, no. 25, pp. H1065-1071.** (Reprinted from *CPR National Journal*, v. 3, no. 3, 16 January 1971, pp. 101-112.)

Describes the operation and administration of the National Academy of Sciences (NAS); discusses NAS's "growing role as an adviser to government agencies and Congress" and its relationship with industry; lists some of the more important issues it has encountered (e.g., drug efficacy, food nutrition, radioactive wastes, air quality, social mixing, power plant siting, herbicides); discusses the structure, staff, and finances of the National Research Council (NRC), as well as the activities and 1970 budgets of its ten administrative divisions.

667. **Barfield, C. E., "Science Report/Handler Moves to Make Academy More Active, Useful as Federal Adviser", *Congressional Record*, v. 117, no. 25, pp. 1071-1075.** (Reprinted from *CPR National Journal*, v. 3, no. 5, 30 January 1971, pp. 220-230.)

Analyzes the efforts of NAS president P. B. Handler and the Academy itself to "reform its internal organization so as to deal more effectively with social issues and its attempts to exercise a greater influence upon federal science priorities"; gives brief personal descriptions of Handler and his top aides (Sitton, Coleman, and Lewis); discusses the Committee on Science and Public Policy (COSPUP), NAS's relations with the National Academy of Engineering, Congress, and the White House Office of Science and Technology; presents an NAS organization chart and the names of its 17-man Council.

668. **"Academy Squirms a Little in Sudden Spotlight",** ***Nature*****, v. 213, no. 5297, 7 May 1971, pp. 6-8.**

Describes some events of the 1971 annual meeting of the National Academy of Sciences: resignations in protest of secret projects, denial of membership to a scientist because he wrote "an alarmist and scientifically doubtful popular article", an attempt by one member to maneuver the academy into a position which would give support to his racist views, and an increase in the annual intake of new members.

669. **Walsh, J., "National Research Council: And How It Got That Way",** ***Science*****, v. 172, no. 3980, 16 April 1971, pp. 242-246.**

Describes the growth of the National Research Council (NRC) out of the National Academy of Sciences (NAS); gives history of NRC's administration; states that NRC is an advisory council only; points to changes being initiated in NRC's policy so as to be "responsive and responsible".

670. **Walsh, J., "National Research Council (II): Answering the Right Questions?",** ***Science*****, v. 172, no. 3981, 23 April 1971, pp. 353-357.**

Reviews the operation of the National Academy of Sciences and its "unresolved" relationship with the National Academy of Engineering, discusses the birth and activities of the Committee on Science and Public Policy, the Report Review Committee, and the Environmental Studies Board, and the shift in emphasis from science-government concerns to science-society concerns.

671. **Boffey, P. M., "Science Policy: An Insider's View of LBJ, DuBridge, and the Budget",** ***Science*****, v. 171, no. 3974, March 1971, pp. 874-876.**

Consists mainly of observations by W. D. Carey, former Assistant Director of the Bureau of the Budget, to science writers at a 3-day seminar on science and public policy last February; budget cutbacks stemming from ex-President Johnson's personal feelings toward science are discussed; interplay among the White House Office of Science and Technology, the National Science Foundation, and the Office of Management and Budget is described.

672. **Reese, K. M., "Scientific Societies and Public Affairs",** ***Chemical & Engineering News*****, v. 49, no. 18, 3 May 1971, pp. 30-35.**

Describes the role in public affairs played by the National Academy of Sciences and its Committee on Science and Public Policy and by many other learned bodies that have formed committees for the purpose of supplying public service; discusses the societies' motivation, issues, government need, tax problems,

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publications, and other activities.

673. **Shapley, D., "FAS: Reviving Lobby Battles ABM, Scientists' Apathy",** *Science,* **v. 171, no. 3977, 26 March 1971, pp. 1224-1227.**

Describes the history and revival of the Federation of American Scientists (FAS) and current efforts to expand its membership and participation into the "voice of science on Capitol Hill".

674. **Runnels, H., "Introduction of the Science and Technology Act of 1971",** *Congressional Record,* **v. 117, no. 33, 10 March 1971, pp. E1759-1760.**

Presents background and arguments for the creation of "a long needed Department of Science and Technology" so as to "consolidate the authority and responsibility for the execution of the research, development, test and evaluation of the national science and technology programs"; contends that centralized control of the federal science and technology function will facilitate the formulation of a national science policy and plan, the establishment of procedures for review and evaluation of programs to solve the pressing problems of society, and the assessment of new technology.

POLLUTION – AIR

675. **Middleton, J. T., "Rescuing Our Environment: The First Priority",** *Chemical Technology,* **April 1971, pp. 204-206.**

The Acting Commissioner of the Air Pollution Control office of the Environmental Protection Agency (EPA) discusses steps being taken to control air pollution from automotive emissions and stationary sources; examines the problem of sulfur oxide pollution from electric generating plants; mentions other major industrial sources of air pollution and the challenge to industry researchers to deal with them.

676. **Middleton, J. T., "Planning Against Air Pollution",** *American Scientist,* **v. 59, no. 2, March-April 1971, pp. 188-189.**

The Acting Commissioner of the Air Pollution Control Office discusses the major sources of air pollution and methods used for its measurement and control.

677. **"Automotive Pollution: The R&D Approach",** *Environment Report,* **v. 2, no. 1, 4 May 1971, pp. 1-5.**

Describes the two-part Advanced Automotive Power Systems (AAPS) Program of the Environmental Protection Agency's Air Pollution Control Office, to promote R&D toward the production of a "virtually pollution-free" automobile within 5 years; one part, the **Clean Car Incentive Program,** is considering seven types of power systems; the other part, the **Federal R&D program,** provides financial incentives for the private sector to produce an alternative power source.

678. **"Autos, Emission Reports and the Public",** *Science News,* **v. 99, no. 17, 24 April 1971, p. 280.**

Discusses reports by automobile companies on progress with emission controls and unconventional power sources, as required by the 1970 amendments to the Clean Air Act; mentions reluctance of some companies to reveal how much they are spending.

679. *Automotive Fuels and Air Pollution,* **Report of the Panel to the Commerce Technical Advisory Board, U.S. Department of Commerce, March 1971, 32 pp.** (Available from U.S. Government Printing Office, Washington, D.C. 20402. Price: 40 cents.)

Concludes that unleaded, low-octane fuel can be produced for new vehicles without major dislocations in the petroleum refinery industry, that legislation is needed to empower the Government to regulate automotive fuel composition, and that automobile manufacturers should refrain from increasing engine octane requirements for at least 4 years; discusses low-lead-fuel availability and emissions from old engines and from gasoline-powered equipment other than automobiles.

680. **"What Future for the Auto?",** *Science News,* **v. 99, no. 20, 15 May 1971, pp. 329-330.**

Discusses the difficulties encountered by auto manufacturers as they attempt to control the emissions from the internal-combustion engine; questions whether or not the auto should be permitted in urban areas.

681. **"Cities Face Decisions on Autos",** *Science News,* **v. 99, no. 19, 8 May 1971, p. 314.**

Describes some neglected national standards called for in the 1970 amendments to the Clean Air Act which, at the present rate of pollution of city air by automobiles, would require a "fairly drastic restructuring of urban transportation".

682. **Lear, J., "The Skeleton in the Garage",** *Saturday Review,* **5 June 1971, pp. 47-48.**

Examines the statistics in the U.S. Senate document "Economics of Clean Air", issued by the EPA last March; the document suggests that the substantial cost of "cleansing air by stifling internal combustion exhaust" should be charged to those who use private automobiles instead of public transportation within the city.

683. **Goldshore, L. P., and Tozzi, J. J., "The State's Role in the Development of Local Air Pollution Control Programs",** *Journal of the Air Pollution Control Association,* **v. 21, no. 3, March 1971, pp. 115-117.**

Examines the history of air-pollution control in New Jersey and how it relates to the development of the state-local government relationship and to the coordination of control efforts; describes the method for developing local control programs.

684. *Profile Study of Air Pollution Control Activities in Foreign Countries, First-Year Report,* **Government Research Laboratory, Esso Research and Engineering Co., Contract CPA 22-69-68, November 1970, 816 pp.** (Available as supplies permit by requesting National Air Pollution Control Administration Publication No. APTD-0601 from the Office of Technical Information and Publications, National Air Pollution Control Administration, U.S. Department of Health, Education and Welfare, 1033 Wade Ave., Raleigh, N. Car. 27605.)

Contains profile texts of each of 13 countries, giving geography, political features, current air-pollution controls, future trends, and relationships among major air-pollution control organizations; also presents an index card for each individual organization and group in each country, defining its role; gives material collected during the first year of a 2-year contract.

POLLUTION – INTERNATIONAL COOPERATION

685. **"International Collaboration Prime Goal",** *Chem 26*, **v. 7, no. 4, April 1971, p. 38.**

Describes a report to President Nixon and the Chairman, Council of Environmental Quality, by the National Industrial Pollution Control Council (NIPCC) recommending, among other things, massive industry-government collaboration to assure prompt and effective international environmental action and condemning the selling of rights to pollute (through environmental taxes).

686. **Eldin, G., "The Need for Intergovernmental Cooperation and Coordination Regarding the Environment",** *The OECD Observer,* **no. 50, February 1971, pp. 3-7.**

Summarizes a lecture at the January Battelle International Conference on Goals and Strategy for Environmental Quality Improvement in the Seventies covering the relationship of environmental protection to international trade, to location of industries, and to economic growth; suggests forms for international cooperation.

687. **"OECD's Programme on the Environment",** *The OECD Observer,* **no. 50, February 1971, pp. 7-8.**

Outlines the work program of OECD's Environment Committee, covering two main areas: natural resources and pollution control, and improvement of the urban environment; announces the establishment of a central analysis and evaluation unit within OECD's Environment Directorate.

688. *Protecting the World Environment in the Light of Population Increase,* **a Report to the President, Executive Office of the President, Office of Science and Technology, December 1970, 36 pp.** (Available from U.S. Government Printing Office, Washington, D.C. 20402. Price: 50 cents.)

Presents findings from an interagency study to develop means to safeguard the world environment in the light of population increases; describes the nature and extent of the problems of the world environment, discusses areas needing attention, and makes ten recommendations for the U.S. Government to act upon to improve the world environment.

689. **Wilson, T. W., Jr.,** *The Environment: Too Small A View,* **An Occasional Paper, The Aspen Institute for Humanistic Studies, 1970, 32 pp.**

Prepared as an introduction to a forthcoming report covering a "survey of international environmental activities", this paper was also distributed to participants in the Institute's Executive Seminar Program as background information for discussions of the environmental crisis; discusses worldwide environmental problems retrospectively, and touches on their implications for the future.

690. **Robinson, G. D., "Global Environmental Monitoring",** ***Technology Review*****, v. 73, no. 7, May 1971, pp. 19-27.**

Discusses global monitoring of the environment – to provide a warning or advice concerning phenomena of potential worldwide impact; examines in detail the eight critical global environmental problems identified by the 1970 Study of Critical Environmental Problems (S.C.E.P.) and suggests that global monitoring be organized on an international scale.

691. **Malmgren, H. B., "Environmental Control and the International Economy",** ***Congressional Record*****, v. 117, no. 33, 11 March 1971, pp. S3034-3037.**

A paper given at the January Battelle International Conference on Goals and Strategy for Environmental Quality Improvement in the Seventies; deals with domestic and international economic effects of various approaches to correcting environmental problems; discusses the different approaches resulting from national differences, and points out the need for harmony, not uniformity.

692. **Miller, G. P., "A Joint House-Senate Colloquium on International Environmental Science",** ***Congressional Record*****, v. 117, no. 50, 7 April 1971, pp. E3006-3007.**

Announces the Joint House-Senate Colloquium on May 25-26 to discuss the status of scientific information as a basis for pending decisions on global environmental problems; reviews the history and activities of the House Committee on Science and Astronautics related to international environmental problems.

693. **Gillette, R., "Human Environment Conference: Slow Start Toward Stockholm",** ***Science*****, v. 172, no. 3987, 4 June 1971, pp. 1011-1013.**

Comments on the shallow interest shown at a 2-day colloquium held in Washington to advertise the UN-sponsored Conference on the Human Environment, to be held in Stockholm in 1972; this "first global conference on the full range of the earth's environmental problems" is designed to foster international efforts in environmental cleanup and pollution control.

POLLUTION – NOISE

694. ***The Noise Around Us: Findings and Recommendations*****, Report of the Panel on Noise Abatement, U.S. Department of Commerce, September 1970, 24 pp.** (Available from U.S. Government Printing Office, Washington, D.C. 20402. Price: 50 cents.)

Summarizes the findings and 12 recommendations of the Panel, concerning the seriousness of noise pollution in the U.S.; concludes that major impediments to effective noise control are social, political, legal, and economic, rather than technical; the complete, detailed Panel report is available for $6.00 from the National Technical Information Service, Springfield, Va. 22151.

695. **"EPA Opens Noise Office",** ***Washington Science Trends*****, v. 26, no. 6, 17 May 1971, p. 34.**

Announces the opening of an Office of Noise Abatement and Control within the Environmental Protection Agency, 1626 K St., N.W., Wash., D.C. 20460, with A. F. Meyer as acting director; the Office plans to study assorted noise effects and to project the growth of urban noise levels through the year 2000; recommendations for legislation or action, based on public hearings and research, are to be submitted to Congress by 31 December.

696. **Ryan, W. F., "The Office of Noise Abatement and Control: A Status Report",** ***Congressional Record,*** **v. 117, no. 82, 2 June 1971, pp. E5316-5318.**

Discusses the need for more Federal appropriations for noise abatement; includes a "Summary Status Report" covering activities of the Office of Noise Abatement Control of the Environmental Protection Agency, and also a reprint of the "Noise Pollution and Abatement Act of 1970".

697. **"Battle Against Noise Pollution Moves into Legislative Arena",** ***Product Engineering,*** **v. 42, no. 5, 1 March 1971, pp. 14-15.**

Reports that the Administration has proposed comprehensive noise-control legislation that would authorize the EPA to set noise standards on transportation, construction, and other equipment and require labeling of noise characteristics of certain products, such as lawn mowers and vacuum cleaners; discusses other legislation, noise standards, and the role of state and local governments in dealing with noise problems.

698. **Ryan, W. F., "Noise",** ***Congressional Record,*** **v. 117, no. 77, 24 May 1971, pp. E4964-4965.**

Presents four resolutions passed by the National Organization to Insure a Sound-Controlled Environment (NOISE) petitioning the Congress "to take specific actions to abate aircraft noise".

699. **"Noise: The Sonic Boomerang",** ***Congressional Record,*** **v. 117, no. 64, 4 May 1971, pp. E3917-3921.** (Reprinted from *Consumer Action Now, Inc., Newsletter* No. 4.)

Dramatizes the noise pollution problem; presents data on noise levels from common sources and their physiological effects; discusses "the politics of noise" and legislative regulation.

700. **"Airport Noise Rules May Be Top SST Test",** ***Aviation Week & Space Technology,*** **v. 94, no. 15, 12 April 1971, pp. 30-31.**

Suggests that the most severe test for the Anglo/French Concorde and the Soviet Union's Tupolev Tu-144 supersonic transports as they prepare to enter the U.S. for regular airline operations in the mid-1970s may be stiff noise-level requirements; discusses airplane noise levels and bilateral air transport agreements.

701. **Woolsey, J. P., "New Noise Regulations Possible for SSTs",** ***Aviation Week & Space Technology,*** **v. 94, no. 16, 19 April 1971, p. 32.**

Describes possible easing in Federal Aviation Administration (FAA) noise standards as they would apply to the Anglo/French Concorde and Russian Tupolev Tu-144 SST's if they were to be used for service to the U.S.

702. **Wilson, C. H., "Legislation to Muffle Jet Aircraft Noise in the United**

States", *Congressional Record,* v. 117, no. 54, 20 April 1971, pp. E3280-3281.

Proposes a bill requiring the retrofitting of all existing jet engines with noise-suppression devices within 5 years to reduce their noise levels by 50 to 75%; FAA requires that new aircraft put into service after January 1, 1972, must be so equipped; the $1 billion cost of retrofitting current engines is to be partially recovered from an authorized fare increase (1½%).

POLLUTION – PESTICIDES AND HERBICIDES

703. **Aldrich, S. R., "Man and His Environment", *Congressional Record,* v. 117, no. 27, 3 March 1971, pp. E1395-1396.**

Argues on behalf of the agriculturist against rash judgements by the public as to the adverse effects of agricultural technology on the environment; believes "only more science and technology correctly applied can solve the problems", and that restrictions on the use of fertilizers and pesticides should not be imposed in panic "lest the cure be worse than the disease".

704. **"New Law in Prospect", *Nature,* v. 230, no. 5292, 2 April 1971, p. 274.**

Reports that the Senate Committee on Agricultural Research and General Legislation has begun its inquiries into the Administration's proposal that all uses of chemical pesticides should be individually licensed by a competent authority; discusses the three categories of insecticides the new bill would create and also the difficulty of training the necessary qualified people.

705. **Purcell, G., "Panel Discussion on Pesticides", *Congressional Record,* v. 117, no. 75, 20 May 1971, pp. E4820-4822.**

Presents the transcript of a TV panel discussion on pesticides, covering the economic losses and resulting food price increases from discontinuing their use, persistence as a function of detection sensitivity, pesticide effects on wildlife, curtailment of pesticide R&D by industry because of restrictions, and Federal regulation.

706. **Obey, D. R., "Nonchemical Control of Pests", *Congressional Record,* v. 117, no. 64, 4 May 1971, pp. E3912-3913.**

Presents a plea and arguments for the release of $1 million which had been earmarked for research by the Department of Agriculture on nonchemical methods of pest control and subsequently frozen by the Administration.

707. **Obey, D. R., "Control of Agricultural and Forests Pests by Integrated Biological-Cultural Methods", *Congressional Record,* v. 117, no. 66, 6 May 1971, p. H3640.**

Discusses and presents the text of a bill which would direct the Agriculture Department to "conduct pilot projects in the integrated approach to the control of pests" by such means as sterilization and specialized farming practices, and expand the NSF's fundamental research programs in this area.

708. *Report on 2, 4, 5-T,* **prepared for the President's Science Advisory Committee by a special Panel on Herbicides, 7 May 1971.** (Available from U.S. Government Printing Office, Washington, D.C. 20402. Price: 40 cents.)

Reviews the Scientific basis for governmental actions and regulations of a number of herbicides used domestically and abroad.

709. **"PSAC Hiccoughs Over 2,4,5-T",** *Nature,* **v. 231, no. 5300, 28 May 1971, pp. 210-211.**

Examines the results of a 1969 study by a panel for the President's Science Advisory Committee (PSAC) on the herbicide 2,4,5-T and its suspected ability to cause malformations in animal offspring; discusses shortcomings of Panel's report, recently made public.

710. **"EPA Comments on Status of DDT Hearings",** *Environmental News,* **Environmental Protection Agency, Washington, D.C. 20460, 2 May 1971, 3 pp.**

Discusses the delay in scheduling of hearings to determine whether or not there should be federal prohibition of all remaining uses of DDT; a scientific advisory committee will review and report on EPA's cancellation of other registered DDT uses to help Administrator Ruckelshaus reach a final decision.

711. **"St. George Versus a Gypsy Moth",** *Nature,* **v. 231, no. 5299, 21 May 1971, pp. 142-143.**

Announces plans by the U.S. Department of Agriculture to spray some 400,000 acres of Pennsylvania, New York, and New Jersey forest with carbaryl to control the gypsy moth, in spite of the "excellent" objections raised by the 18,000-member Environmental Defense Fund and others, and in spite of the fact that the environmental-impact statement filed by the USDA was considered unsatisfactory by the Council on Environmental Quality.

POLLUTION – PROBLEMS AND CONTROL

712. **Sax, J. L.,** *Defending the Environment: A Strategy for Citizen Action,* **Introduction by Senator George McGovern, Alfred A. Knopf, New York, 1971, 252 pp. ($6.95).**

Develops two central theses: that the citizen does not need a bureaucratic middleman to identify and prosecute his interest in environmental quality; that access to the courts of the U.S. is the most effective means for citizens to participate in environmental decisions and may be the only way to assure that democratic processes are brought to bear on environmental problems.

713. **Greenberg, D., "Accomplishments of the Environment Lobby",** *New Scientist and Science Journal,* **v. 50, no. 748, 22 April 1971, p. 218.**

Applauds the growing U.S. commitment to defeating pollution, from environmental politics to the stifling of a barge canal across Florida and a nuclear power plant at Columbia University.

714. **McDonald, J. H., "Washington Daily News' Supplement on the Environment",** *Congressional Record,* **v. 117, no. 37, 17 March 1971, pp. E1950-1954.**

Presents a collection of articles by leaders of efforts to control pollution, dealing with pollution control measures, duties of environmental agencies, public support for a better environment, and the international scope of the pollution problem.

715. **"The Environmental Challenge: Legislative and Political Trends",** ***Engineering and Mining Journal,*** **v. 172, no. 4, April 1971, pp. 71-75.**

Presents an interview with EPA Administrator Ruckelshaus concerning the legislation and politics behind pollution control; examines the methods of enforcement and control of future Federal or local emission standards; discusses the problem of a worldwide temperature change due to pollution, and the levels of CO_2 and SO_2.

716. **Ruckelshaus, W. D.,** ***Reality Before Rhetoric in the Environmental Movement,*** **address before the Audubon Society, Milwaukee, Wisconsin, 22 May 1971, 12 pp.** (Available from the Environmental Protection Agency Office of Public Affairs, Washington, D.C. 20460.)

Reviews the efforts of the Environmental Protection Agency to enforce quality standards for the environment; discusses the EPA's final air-quality standards; examines the President's 1971 environmental package.

717. **"Summary of Major Findings and Recommendations, Study of Critical Environmental Problems (SCEP) – Sponsored by Massachusetts Institute of Technology",** ***Congressional Record,*** **v. 117, no. 42, 24 March 1971, pp. S3764-3767.**

Discusses the seven global environmental problems studied and summarizes conclusions and recommendations for each; these are problems "whose cumulative effects on ecological systems are so large and prevalent that they have world-wide significance".

718. **Ritchie-Calder, Lord, "Planet Earth: Renewing the Options",** ***Congressional Record,*** **v. 117, no. 61, 29 April 1971, pp. E3708-3710.** (Reprinted from *The Rotarian Magazine*.)

Dramatizes the environmental problems man has created from the beginning of his existence; submits a solution that involves making industry responsible not only for the disposal of its manufacturing wastes, but also for the disposal of its product once it has become waste.

719. **Commoner, B., Corr, M., and Stamler, P. J., "The Causes of Pollution",** ***Environment,*** **v. 13, no. 3, April 1971, pp. 2-19.**

Draws the conclusion that "the predominant factor in our industrial society's increased environmental degradation is neither population nor affluence, but the increasing environmental impact per unit of production due to technological changes"; a table shows changes in production or consumption per capita for 50 items in the period 1946-68.

720. **van Tassel, A. J., "A Seminar Exercise in Forecasting Ecological Changes: Pollution from Rising Industrial Output",** ***Technological Forecasting and Social Change,*** **v. 2, no. 3/4, 1971, pp. 237-245.**

Discusses the effects of the ever-rising production levels in the U.S. on the quality of the environment; utilizes production and consumption projections from a study by Ford Foundation's Resources for the Future, Inc. (REF), which gives the output of "virtually every commodity to be produced by the economy during the years 1960-2000".

721. **Hollis, M. D., "Today's Environment",** ***Journal of the Water Pollution Control Federation,*** **v. 43, no. 3, pt. 1, March 1971, pp. 365-371.**

Discusses how man has changed the world through discovery and exploitation of the environment; technology has created the environmental pollution problem, and it can relieve it; the means by which government organizations at all levels and the professional disciplines can achieve such relief are discussed.

722. **Cole, L. C., "People and Environment",** ***Environmental Education,*** **v. 2, no. 3, Spring 1971, pp. 20-23.**

Discusses the problems we are bequeathing our descendants: dying lakes and rivers, soil decreasing in fertility, exhausted mineral deposits, and polluted oceans; considers the most basic problems to be the population explosion and the passion for economic growth.

723. **Stilley, B., "The Environmental Challenge: An Environmentalist's View",** ***Engineering and Mining Journal,*** **v. 172, no. 4, April 1971, pp. 75-77.**

Discusses what is needed to solve the pollution problem: technology, a stable population, a "no-growth" economy, and a new commitment by the technical world to nonmaterialistic values that include such factors as "feelings and aesthetics".

724. **"A Hard Look at Our Environment: Excerpts From Remarks by Secretary of the Interior Rogers C.B. Morton",** ***Congressional Record,*** **v. 117, no. 75, 20 May 1971, pp. H4162-4163.**

Advocates overcoming the pollution problem by a "realistic national commitment for a healthier environment" and by not only conserving but making needed sacrifices to restore the environment; points out the importance to the environmental movement of the President's proposed plan to consolidate the seven present departments into four, one of which will be the Department of Natural Resources.

725. **Dingell, J. D., "Systems Approach Needed for Environmental Problems",** ***Congressional Record,*** **v. 117, no. 31, 9 March 1971, pp. H1363-1365.** (Reprinted from *Catalyst for Environmental Quality,* Fall 1970.)

Discusses the first report of the President's Council on Environmental Quality and "the need to systematize our relationship and approach to the environment and to the use and reuse of our resources"; points out that the first step in the systems approach – passage of the Environmental Policy Act of 1969 – is accomplished; the second – creation of a National Environmental Data Bank – is needed to provide useful information quickly as required to all concerned agencies; discusses recycling of wastes and the cost-benefit ratio of pollution control.

726. **Passer, H. E., "The Environment, Economics, and Public Policy",** ***Congressional Record,*** **v. 117, no. 64, 4 May 1971, pp. S6173-6175.**

Describes four Federal pollution-control organizations started in 1970; presents a few unfounded beliefs concerning pollution and gives the facts to explode these myths; discusses environmental policy issues that are presently unsettled, such as Federal versus local control standards, pollution taxes, and priorities.

727. **Tribus, M., "Engineering Education: Ecological Issues", Paper presented at the Conference on Engineering Education and Environmental Problems, State University of New York, Albany, New York, 2 February 1971,** *Vital Speeches of the Day,* **v. 37, no. 13, 15 April 1971, pp. 410-413.**

Discusses the environmental responsibilities of the Federal Government; calls for more technical people in authoritative positions; examines the role of private industry and education in pollution control.

728. **"Ignorance Big Problem, Study Shows",** *Chem 26,* **v. 7, no. 4, April 1971, pp. 39-40.**

Presents the results of a survey of public beliefs concerning the environment and pollution control by big industries; says poor industrial public relations is responsible for public ignorance of the true advances in pollution control; lists plans of some big industries to control their own pollution.

729. **"Position Papers and Abstracts on Environmental Pollution",** *Congressional Record,* **v. 117, no. 80, 27 May 1971, pp. E5138-5146.**

Reprints three position papers: "The Army Corps of Engineers and the Environment", "Water Pollution Laws", and "A New Federal Role in Solid Waste Management" and abstracts of ten others – all prepared by students in a New York high-school environmental class; topics include mass transit, population, pesticides, noise pollution, and energy production; papers are heavily documented and capably cover the essential factors needed for effective action.

730. **Udall, S., and Stansbury, J., "Selling Ecology to the Hardhats",** *Congressional Record,* **v. 117, no. 65, 5 May 1971, pp. S6286-6288.**

Discusses the relationship between pollution control and the labor force and labor unions; delves into economic problems resulting from pollution control that must be solved legislatively.

731. **Shepard, T. R., Jr., "The Environmental Challenge: The Disaster Lobby",** *Engineering and Mining Journal,* **v. 172, no. 4, April 1971, pp. 77-80.**

Discusses and gives examples of the efforts of "Disaster Lobbyists" like Ralph Nader to "solve" environmental problems by demanding laws to regulate industry; labels the lobbyist as a pessimistic alarmist who believes that only "a brand new socio-economic system can save us".

732. **Cowen, R. C., "Farm Pollution and a Nation's Future",** *Technology Review,* **v. 73, no. 6, April 1971, pp. 6-7.**

Reports that manure, once the great restorer of Britain's farmlands, has become a financial embarrassment to today's high-productivity farmer and an important factor in the growing problem of agricultural pollution; some experts think that in order for countryside catastrophe to be averted, industrialists, townplanners, and everyone will have to accommodate themselves to lower production farming.

POLLUTION – RADIATION

733. **Tsivoglou, E. C., "Nuclear Power: The Social Conflict",** ***Environmental Science & Technology,*** **v. 5, no. 5, May 1971, pp. 404-410.**

Analyzes the environmental effects of nuclear power plants; describes the origination of radioactive waste in the plant, the "human exposure route" of the radioactive particle in both gaseous and liquid forms, long-term effects, and cost of nuclear power generation; questions whether any industry has the right to pollute the environment to a needless degree.

734. **Foreman, H. (Ed.),** ***Nuclear Power and the Public,*** **University of Minnesota Press, Minneapolis, 1970, 273 pp. ($9.00).**

Based on papers and discussion from a conference held at the University of Minnesota; subjects discussed include basic information on reactors, effects of nuclear plants on the environment, monitoring and surveillance, health hazards, radiation standards, and a summation of the benefits and risks of nuclear power.

735. **Ellis, H., "No Reactors in New York City",** ***New Scientist and Science Journal,*** **v. 50, no. 749, 29 April 1971, p. 272.**

Discusses New Yorkers' "irrational fear" of accidental radiation exposure, which is responsible for the Licensing Board's refusal to allow Columbia University to operate its already built "ultrasafe" Triga nuclear reactor for research and education; describes New York's dilemma: the dire need for more generating capacity and the public's objections to both fossil and nuclear plants.

736. **Dole, R., "Proposed Nuclear Repository at Lyons, Kans.",** ***Congressional Record,*** **v. 117, no. 66, 6 May 1971, pp. S6321-6323.**

Summarizes comments of the Environmental Protection Agency on the AEC's draft environmental impact statement on the proposed salt-mine repository for radioactive wastes; calls attention to specific types of additional information that should be included.

737. **Hosmer, C., "Nuclear Energy: Are the Environmental Hazards Real or Fancied?",** ***Congressional Record,*** **v. 117, no. 80, 27 May 1971, pp. E5170-5171.**

Discusses the "relationship of nuclear energy to the environment"; analyzes five common fears about the dangers of atomic power plants and indicates that these are largely unfounded; discusses the wisdom of the planned underground nuclear weapons test on Amchitka Island this fall.

738. **Bazell, R. J., "Nuclear Tests: Big Amchitka Shot Target of Mounting Opposition",** ***Science,*** **v. 172, no. 3989, 18 June 1971, pp. 1219-1221.**

Describes debate over the scheduled Cannikan test, "the largest underground nuclear device ever to be detonated" by the AEC, based on fears of triggering a possible earthquake and destructive sea wave; discusses the validity and adequacy of the AEC's environmental impact statement for the test.

POLLUTION – SOLID WASTES

739. **Vaughan, R. D., "Solid Waste Management – Everybody's Problem",** *Environmental Science & Technology,* **v. 5, no. 4, April 1971, p. 293.**

Gives ways in which everyone (including the scientist, economist, law enforcer, municipal official, industrialist, educator, and concerned citizen) can help solve the problem of solid waste management; the author is Acting Commissioner, Solid Wastes Management Office, EPA.

740. **Fish, H., Jr., "Environmental Problems",** *Congressional Record,* **v. 117, no. 66, 6 May 1971, pp. H3592-3594.**

Introduces legislation governing the management and disposal of solid waste; the bill establishes a system of solid-waste processing recycling centers, encourages research in recycling, supports the production of easily recycled products, and levies a tax on nonconsumable products to discourage their manufacture and help pay for their disposal.

741. **Hanlon, J., "Cycling the Paper Round",** *New Scientist and Science Journal,* **v. 50, no. 749, 29 April 1971, pp. 258-260.**

Discusses the poor market for recycled paper as a stumbling block in this facet of the ecology movement; suggests "consumer education", and predicts a 5 to 10-year uphill fight by the environmentalists.

742. **Lesher, R. L.,** *Solid Waste: The Third Pollution or the Fourth Forest,* **presented at Miami University, Pulp and Paper Foundation Conference on Fiber Recovery from Solid Waste and Its Use, 22 June 1971.** (Copies may be obtained from National Center for Solid Waste Disposal, Inc., 1211 Connecticut Ave., N.W., Washington, D.C. 20036.)

Develops the theme that the $4.5 billion-a-year trash-disposal operation in U.S. cities must be replaced by recycling and conversion to return the elements now being burned or buried to their place in the ecology; urges definition of national goals, establishment of priorities, identification of needs, and mobilization of resources.

743. **"EPA Supports Research in Plastics Recovery Methods",** *Environmental News,* **Environmental Protection Agency, 23 June 1971, 1 p.**

Announces a grant of $62,142 to the University of Texas for research on recovery, from a common solid-waste source, three major plastics that are chemically incompatible with one another – polyethelene, polystyrene, and polyvinyl.

744. **Fowler, J. E., "Castoff Industry Turns Uglification Into Beautification",** *Congressional Record,* **v. 117, no. 28, 4 March 1971, pp. E1507-1509.** (Reprinted from December 1970 *Association Management.*)

Discusses the "basic role which the Institute of Scrap Iron and Steel plays in bridging the ecology gap between its industry and publics – a clearing house and information source on the state of metallic solid waste reclamation for government, concerned and interested citizens, the news media and industry".

POLLUTION – WATER

745. **"Water Gets Worse",** *Nature,* **v. 230, no. 5295, 23 April 1971, pp. 486-487.**

Discusses the ineffectiveness of government programs and demonstration projects for reducing water pollution as brought out in "Water Wasteland", a report based on 2 years of research by a 25-man Nader task force; gives examples of unsuccessful pollution-control projects.

746. **Lear, J., "Environment and the Quality of Life – Environment Repair: The U.S. Army Engineers' New Assignment",** *Congressional Record,* **v. 117, no. 61, 30 April 1971, pp. E3839-3843.**

Discusses the Army Corps of Engineers' new assignment by the EPA to "undertake field studies of feasible alternative methods of modern sewage disposal"; examines some of the problems encountered in regional waste-water management.

747. **Gilluly, R. H., "New Directions in Water Pollution Abatement",** *Science News,* **v. 99, no. 17, 24 April 1971, pp. 286-287.**

Discusses the need for innovation in water pollution abatement; new methods consider sewage as "resources out of place" rather than wastes; describes a project in Muskegon County, Michigan, where sewage is being used to enrich marginal soil and raise the water table at the same time.

748. **"U.S. Monitors Discharges into Inland Waterways",** *Chemical and Engineering News,* **v. 49, no. 18, 3 May 1971, pp. 21-22.**

Describes how the Army Corps of Engineers and the Environmental Protection Agency are controlling and monitoring pollution discharges into navigable waters under terms of the Refuse Act of 1899 and the Refuse Act permit program.

749. **"Detergent Pollution: Statement by Jesse L. Steinfeld, M.D.",** *Congressional Record,* **v. 117, no. 82, 2 June 1971, p. E5263.**

Warns against using phosphate substitutes in detergents without adequate assurance that the substitute "does not create equal or greater hazards to the environment or to human health"; cites the dangers of caustics and recommends deferring a decision on detergent package labelling until more research has been done.

750. **"Detergers Deterred",** *Nature,* **v. 230, no. 5293, 9 April 1971, pp. 349-350.**

Describes historical events related to regulations regarding use of phosphate detergents and phosphate substitutes; compares the situation with the costly and inefficient handling of the SST and cyclamates, wherein environmentalists overstate their arguments, while politicians and rival government agencies "compete for a piece of the action".

751. *Research, Development, and Demonstration Projects, Fiscal Year 1969,* **Volume II, Division of Process Research and Development, Federal Water Pollution Control Administration, U.S. Department of the Interior, Washington, D.C. 20242, 122 pp.** (Available from the issuing agency.)

Provides an information sheet for each of the 122 grants and contract projects funded by the Division's Office of R&D during FY 1969, giving grantee, project number, and title, funding, director, FWPCA monitor, and project description; includes R&D studies, training, and information programs dealing with water-pollution control.

752. *Research, Development, and Demonstration Projects, Fiscal Year 1970,* **Division of Process Research and Development, Federal Water Quality Administration, U.S. Department of the Interior, Washington, D.C. 20242, 111 pp.** (Available from the issuing agency.)

Treats the 111 grants and contract projects funded during FY 1970 in the same fashion as given in Ref. 751 for FY 1969.

753. *Research, Development, and Demonstration Projects as of July 1970,* **Division of Applied Science and Technology, Federal Water Quality Administration, U.S. Department of the Interior, Washington, D.C. 20242, 445 pp.**

Presents an information sheet for each of the 426 grant and contract water-pollution control projects funded by the Division, showing number, title, contractor, director, funding, dates, and project description (or abstract of final report); indexed by contractor/grantee.

754. **Rosenkranz, W. A.,** *Storm and Combined Sewer Demonstration Projects, January 1970,* **Report DAST-36, Division of Applied Science and Technology, Office of Research and Development, Federal Water Pollution Control Administration, U.S. Department of the Interior, Washington, D.C. 20242, 121 pp.**

Describes the FWPCA's storm and combined sewer pollution control R&D activities; presents abstracts of completed project reports, and detailed information sheets on over 60 active projects listing contractor, title, location, funding, dates, project description, and responsible personnel.

POPULATION

755. **Rouse, H., "Growth≠Progress?",** *Mechanical Engineering,* **v. 93, no. 4, April 1971, pp. 20-23.**

Discusses the fact that many of our pollution problems can be traced to too many people; states that the optimization process should be readily adaptable to the population problem; with quantitative growth under control, pollution could be eliminated, waste products recycled, and qualitative growth emphasized, with the human race itself upgraded; based on a paper presented at the Conference on Engineering and the Future of Man.

756. **Ehrlich, P. R., and Holdren, J. P., "Impact of Population Growth",** *Science,* **v. 171, no. 3977, 26 March 1971, pp. 1212-1217.**

Centers around five theorems which provide a framework for realistic analysis of the role of U.S. population growth in environmental problems; concludes that "population control, the redirection of technology, the transition from open to closed resource cycles, the equitable distribution of opportunity, and the ingredients of prosperity must all be accomplished if there is to be a future worth having"; extensively documented.

757. **Gillette, R., "Population Act: Proponents Dismayed at Funding Levels",** *Science,* **v. 171, no. 3977, 26 March 1971, pp. 1221-1222, 1224.**

Reports that the Administration may end up spending none of the $73 million authorized in fiscal 1971 under the Family Planning Services and Population Research Act of 1970; discusses influencing factors.

758. **Packwood, R. W., "Population Commission Hearings",** *Congressional Record,* **v. 117, no. 62, 30 April 1971, pp. E3749-3772.**

Includes testimony presented by a variety of witnesses at hearings held on April 14 and 15 by the Commission on Population Growth and the American Future; covers a range of subjects related to population growth, including family planning, the ecology and environment, economic development, and women's rights.

759. **Lamson, R. W., "Federal Action for Population Policy – What More Can We Do Now?",** *Congressional Record,* **v. 117, no. 67, 10 May 1971, pp. E4187-4189.**

Discusses the resources the U.S. has available to do more now, through research, planning, and operational programs, to implement a "priority no-growth goal" for its population; recommends prompt, widespread discussion of the problem to stimulate effective use of these resources.

PRIORITIES FOR R&D

760. **Mosher, C. A., "Counterbudget: A Blueprint for Changing National Priorities 1971-76 – Chapter 14. Research and Development",** *Congressional Record,* **v. 117, no. 76, 21 May 1971, pp. E4874-4877.**

This is one of 25 chapters containing specific proposals developed by the National Urban Coalition for the sound expenditure of Federal funds in different areas (see Ref. 894); tabulates R&D budget recommendations by year and category (military, economic growth, infrastructure, environment, social programs, basic research, and other) totaling $15.275 billion for 1972 and increasing to $19.666 billion for 1976; includes separate discussions of economic growth, nuclear energy, space, and basic research.

761. **Pitzer, K. S., "Rethinking Our Scientific Priorities",** *Chemical Technology,* **May 1971, pp. 273-277.**

Discusses the value of both basic and applied science today and the need for better communication among different fields; emphasizes the need for assessment of possible harmful effects of proposed new products or processes; recommends that universities consider offering curricula including combinations of legal, management, and scientific training and reducing the output of Ph.D.'s.

762. **Nichols, R. W., "Mission-Oriented R&D",** *Science,* **v. 172, no. 3978, 2 April 1971, pp. 29-37.**

Discusses the history of the Mansfield Amendment as an example of Congressional concerns about R&D, and analyzes the basis for the Federal Government's R&D policies; makes specific recommendations for Congress and the Administration to restore the scientific and technological health of the country by innovative changes in the institutional machinery for R&D.

763. **McElroy, W. D., "The Transitional Decade",** *Congressional Record,* **v. 117, no. 43, 25 March 1971, pp. S3928-3929.** (Introduction to the National Science Foundation's Annual Report for 1970.)

Discusses the policy of the National Science Foundation for the decade ahead; NSF will deal more with people and the social sciences and give continued support to academic institutions.

764. **"Pitfalls for National Science Foundation",** *Nature,* **v. 230, no. 5293, 9 April 1971, pp. 343-344.**

Suggests that the National Science Foundation is beginning to stray from the straight and narrow path along which the interests of basic science in the U.S. must lie; discusses dangers that may lie in its new policy of decreasing support for graduate students at colleges and universities and in its new program of applied research; also expresses concern that it will not spend its budget to make the fullest use of the intellectual resources of the U.S.

765. **"Social Scientists Still Poor Cousins",** *Nature,* **v. 230, no. 5294, 16 April 1971, pp. 423-424.**

Discusses the bettering position of the social scientist in getting his share of Federal research funds; examines attempts at improving the poor relationship between the department of Defense and the social and behavioural scientist.

766. *Man's Health And The Environment – Some Research Needs,* **Report of the Task Force on Research Planning in Environmental Health Science, U.S. Department of Health, Education, and Welfare, March 1970, 258 pp.** (Available from the U.S. Government Printing Office, Washington, D.C. 20402. Price: $1.25.)

Presents the considered recommendations of over 50 experts for needed research on specific environmental problem areas and on methods and specific disease conditions; a final chapter covers recommendations on social and behavioral sciences, technological trends, training, and organizational needs.

767. **"Atmospheric Sciences: Research Report Critical",** *Washington Science Trends,* **v. 26, no. 8, 31 May 1971, p. 43.**

Presents extracts from the report, *The Atmospheric Sciences and Man's Needs: Priorities for the Future* (available for $3.25 from Printing and Publishing Office, National Academy of Sciences, 2101 Constitution Ave., N.W., Washington, D.C. 20418); panel recommends Federal expenditure of $453 million over the next decade for facilities and R&D on weather prediction, air quality, and weather and climate modification.

SCIENCE POLICY STUDY ORGANIZATIONS

768. **Program of Policy Studies in Science and Technology, The George**

Washington University, *Report 1969-1970,* **88 pp.** (Available from the Publications Office, Program of Policy Studies in Science and Technology, The George Washington University, Washington, D.C. 20006.)

Includes a statement by the Program Director describing the current status and projected developments in technology assessment; discusses areas of inquiry and Program activities; contains 4 appendixes with information on research staffs, participants in seminars, and publications.

769. **Cornell University Program on Science, Technology, and Society,** *First General Report, 1 July 1969 through 31 December 1970,* **19 pp.** (Available from Cornell University Program on Science, Technology and Society, 632 Clark Hall, Ithaca, N.Y. 14850.)

Describes activities from the Program's inception in July 1969 through December 1970; provides details on the Program organization, participants, its publications and research, and its new, interdisciplinary teaching activities.

770. **Cornell University Program on Science, Technology, and Society,** *Program Description and Course List, 1971-72,* **14 pp.** (Available from Cornell University Program on Science, Technology and Society, 632 Clark Hall, Ithaca, N.Y. 14850.)

Gives brief information on the interdisciplinary program established in July 1969 to stimulate teaching and research on the interaction of science and technology with society; describes courses cosponsored by STS and describes related courses.

771. **"The American University",** ***SPPSG Newsletter,*** **v. 2, no. 5, May 1971, pp. 12-13.**

Describes the graduate-level subject matter offered in the Science, Technology, Government field by the School of Government and Public Administration, The American University, Washington, D.C. 20016.

772. **Oster, C. V., "Science and Public Policy Activities in the Division of Public Administration, College of Administrative Science, Ohio State University",** ***SPPSG Newsletter,*** **v. 2, no. 4, April 1971, pp. 11-12.**

Describes a university-wide symposium on "Science, Technology, and Public Policy in the 1970's" held at OSU last October "to lay the foundation for further cooperation among members of various colleges in the University in the science policy area"; describes OSU's curriculum and staff in the science policy field.

773. **Kash, D. E., "University of Oklahoma",** ***SPPSG Newsletter,*** **v. 2, no. 5, May 1971, pp. 11-12.**

Describes the Science and Public Policy Program established at Oklahoma University in September 1970, with technology assessment as the "research focus" and also as the basis for undergraduate courses "focusing on the technologies and problems assessed".

774. **"Science and Public Policy Papers Invited",** ***SPPSG Newsletter,*** **v. 2, no. 4, April 1971, p. 27.**

"Public Policy, the journal of the Kennedy School of Government at Harvard, in cooperation with SPPSG, is planning an issue

devoted to science and public policy studies. Papers are invited. Inquiries should be directed to: Professor Harvey M. Sapolsky, Room E53-423, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139."

SOCIETY-SCIENCE INTERACTION

775. **Fischer, R. B.,** *Science, Man and Society,* **W. B. Saunders Co., W. Washington Sq., Philadelphia, Pa. 19105, 130 pp. ($2.95).**

   Describes how science and technology have shaped today's society and how classroom education can be used to solve current problems like pollution; defines science and shows the relationship between science and technology; discusses and evaluates trends in scientific education and public attitudes.

776. **Pitzer, K. S., "Science and Society: Some Policy Changes Are Needed",** *Science,* **v. 172, no. 3980, 16 April 1971, pp. 223-226.**

   Discusses the "need to review the relationship between science and society" by way of letting Congress "maintain its traditional role, even in technical areas"; reviews a few major characteristics of science relating to the "rationale for public support", and discusses possible changes in policy; considers the optimum-size program in basic science and factors relative to the training of scientists.

777. **Charlesworth, J. C., and Eggers, A. J., Jr. (Eds.),** *Harmonizing Technological Developments and Social Policy in America,* **American Academy of Political and Social Science, Monograph 11, December 1970, 247 pp.** (Single copies may be requested from the American Academy of Political and Social Science, 3937 Chestnut St., Philadelphia, Pa. 19104. Additional copies: $2.00.)

   Based on a conference held 6-7 May 1970; includes commentaries and discussions on six papers: development of social policy in America; recent technological developments with impact; likely technological developments of the future; educating technologists in social policy; how to achieve a balance of progress and control; and machinery needed to harmonize.

778. **Schooler, D., Jr.,** *Science, Scientists, and Public Policy,* **Macmillan Free Press, New York, 1971, 337 pp. ($6.95).**

   Examines the roles and influence of physical, social, and behavioral scientists in space, defense, arms control, weapons, conservation, pollution, foreign aid, agriculture, weather, transportation, health, and other current issues; Part I (7 chapters) covers 1945-1968, and Part II (Chapter 8) covers the 1970's and the year 2000; includes a bibliography and index.

779. **Ways, M., "Don't We Know Enough to Make Better Public Policies?",** *Fortune,* **v. 83, no. 4, April 1971, pp. 64-67, 118, 125, 128.**

   Expresses the belief that much of the guilt, cynicism, and bitterness that currently discolor life in the U.S. derive from a tendency to expect too much from the growth of knowledge; the flow of new knowledge stimulates changes in society that create needs for new kinds of knowledge; racial strife, poverty, crime, urban decay, and pollution are complex problems which we do not know how to deal with; improved public policy requires pursuit of additional knowledge.

780. **Branscomb, L. M., "Taming Technology",** *Science,* **v. 171, no. 3975, 12 March 1971, pp. 972-977.**

Makes a plea for national regulation of technology in a social context; discusses technology's role in society – in the future an increase in productivity will have to come, not from additional exploitation of resources, but from technology and education; lists reasons for the public's frustration with technology; concludes that the important thing is the active involvement of scientists and engineers in those arenas where the decisions on uses of technology are really made.

781. **Weinberg, A. M., "Prudence and Technology: A Technologist's Response to Predictions of Catastrophe",** *BioScience,* **v. 21, no. 7, 1 April 1971, pp. 333-335, 338.**

Discusses the future of technology in an underfed and overpopulated world; points out that the key to providing necessities is energy and suggests that catalytic nuclear burners would supply inexhaustible energy in the future; describes pollution as "the byproduct of affluent technology, not of overpopulation"; contends that technology can provide a reasonable subsistence even when population has quadrupled, but recommends population control to provide a better life for our great-great grandchildren.

782. **Whyte, L. L., "Science and Our Understanding of Ourselves",** *Bulletin of the Atomic Scientists,* **v. 27, no. 3, March 1971, pp. 32-33.**

The author believes that present knowledge can help to restore belief in human nature and to unite all men in a common awareness, on one condition: if we can see running through the four realms of the physical, organic, psychological, and social processes a principle which provides the basis for an adequate image of man; in the discontent of youth he sees an effort to reconstruct our way of living in light of a richer conception of what man should be.

783. **Wheeler, F., "The Show Must Go On",** *New Scientist and Science Journal,* **v. 50, no. 748, 22 April 1971, pp. 204-205.**

Suggests that in order to give science more public appeal, and keep the money coming, scientists should develop their own branch of show business and devise forms of entertainment which relate to science as an appealing by-product.

784. **Brown, M. (Ed.),** *The Social Responsibility of the Scientist,* **Macmillan Free Press, New York, 1971, 282 pp. ($3.95).**

Consists of 16 lectures by young scientists (mostly in biological fields) emphasizing the theme that the scientist needs to be constantly aware of the social results of his work, must make the public aware of potential harm from science, and must strive to improve man's lot; deals with such topics as chemical and biological warfare (J. B. Neilands), food additives (J. Lederberg), radiation (Gofman and Tamplin), population (D. Luten), and various aspects of the humaneness of science.

785. **Seaborg, G. T., "From Man to Mankind – A Way to Go", Remarks**

presented at an International Workshop: Conceptual and Attitudinal Pathways from Man to Mankind, New Haven, Conn., April 29, 1971, ***AEC News Releases,*** **v. 2, no. 18, 5 May 1971, pp. 5-10.**

Speaks of the birth of a new mankind, a breed of humans that is capable of living in harmony with all its members and the earthly home that sustains it; believes that this new birth will involve a long and difficult labor with many complications, but emphasizes that time is **not** running out for the human race.

786. **"Churchmen Ponder Impact of Science",** ***Chemical and Engineering News,*** **v. 49, no. 22, 31 May 1971, pp. 24-25.**

Reports that the Pennsylvania State University, as part of its "public understanding of science" project, conducted a day-long program during the annual Presbyterian General Assembly on the theme "Science-Technology – The Creator's Apprentice"; the program included a panel discussion, three workshops, and addresses by Science Adviser, Dr. E. E. David, Jr., and Nobel Laureate C. H. Townes.

787. **Shapley, D., "Scientist and Public: Chapter and Verse from David",** ***Science,*** **v. 172, no. 3987, 4 June 1971, p. 1010.**

Reviews the address by Presidential science adviser Edward E. David, Jr., concerning the influences of the public on science and technology, presented at an NSF-sponsored day-long program on science, technology, and the church as part of the annual general assembly of the United Presbyterian Church.

788. **"Groups Urge Advocacy Roles for Professionals",** ***Chemical and Engineering News,*** **v. 49, no. 21, 24 May 1971, pp. 15-16.**

Discusses three new organizations (the Adversary System of Scientific Inquiry, the Center for Science in the Public Interest, and the Clearinghouse for Professional Responsibility) which have raised provocative questions concerning the ethical responsibilities of professionals to speak out on technical issues in the public interest; reports on an interview with Ralph Nader, head of the Clearinghouse.

789. ***Science and Public Policy,*** **prepared by the American Foundation for Continuing Education, OCEANA Publications, Inc., Dobbs Ferry, New York 10522, 1970, 650 pp. ($15.00).**

Consists of a collection of papers by famous essayists from Aristotle to Edward Teller, selected to present fundamental ideas of contemporary science and technology and some of their political implications; covers science and human affairs, the population problem, dynamics from Galileo to the space age, the atomic age, methods and nature of science, and others.

790. **Bevan, W., "The General Scientific Association: a Bridge to Society at Large",** ***Science,*** **v. 172, no. 3981, 23 April 1971, pp. 349-352.**

Gives reasons for the apparent disaffection of society in its several segments from the scientific enterprise; discusses the need to increase the public's understanding of science and the special responsibility of scientific organizations like the American Association for the Advancement of Science to interpret science to the larger society and to participate in assessing its consequences;

describes programs and publications of the AAAS.

791. Ashby, E., **"Science and Antiscience",** *Nature,* **v. 230, no. 5292, 2 April 1971, pp. 283-286.**

Highlights some of the points made in the inaugural Bernal lecture delivered at the Royal Society on March 4, 1971, including the disillusionment with science in western affluent societies; the cultivation by some of an ideology of antiscience, questioning the legitimacy of scientific thought; the position of scientists in government policy; and the need to change the goals of British universities; 10 references.

792. **Goldwater, B. M., Jr., "Technology – The Root of All Evil?",** *Congressional Record,* **v. 117, no. 57, 23 April 1971, pp. E3397-3398 (Speech before San Francisco Press Club).**

Defends the need for more emphasis on science and technology; data are given to show the adverse effects of the new antitechnology attitudes on employment, U.S. technical achievements, and the environment; makes recommendations for countering public sentiment against science.

793. **McElroy, W. D., "The Role of Fundamental Research in an Advanced Society",** *American Scientist,* **v. 59, no. 3, May-June 1971, pp. 294-297.**

Expresses the belief that a fundamental change in American society, and not just economic necessity, has caused the public's disenchantment with science, and that "we are entering an era in which the quality of life for every citizen will move far ahead of the gross national product as the measure of our well-being"; discusses how science and scientists should respond.

794. **Roe, R. A., "Technology and Our Environment: the Salvation of Mankind",** *Congressional Record,* **v. 117, no. 47, Part II, 1 April 1971, pp. E2637-2639.**

Includes a statement presented to the Chamber of Commerce of Metropolitan Baltimore by Clifford D. Siverd, president of the American Cyanamid Co. in which he discusses change in our world today, the side effects of technology, and the challenge to reassert our mastery over technology; also discusses several basic points and observations concerning technology assessment.

795. **Dale, E. L., "Nixon Aide Contends Environmentalists Underestimate Social Cost of Goals",** *Congressional Record,* **v. 117, no. 56, 22 April 1971, pp. E3391-3392.** (Reprinted from the *New York Times* of April 20, 1971.)

Reports on a speech given by Hendrik S. Houthakker, a member of the President's Council of Economic Advisers, in which he criticized and even ridiculed some environmentalists who would impose too heavy a "social cost" in trying to achieve their goals; the speech is criticized in an editorial entitled "The Antienvironmentalists" which is reprinted from the April 22nd *New York Times.*

796. **Lansford, H., "Communicating With the Non-Specialist About Basic Environmental Research", paper presented at The 18th International**

Technical Communications Conference, San Francisco, California, 2-5 June 1971. (Proceedings to be published.)

Uses the SST debate as an illustration of the inadequacy of hearings and press coverage as the means for educating policy makers and concerned citizens about critical and complex issues involved in formulating public policy; suggests that new institutions (like the Institute for Environmental Studies proposed by the NAS or the new Inter-American Institute of Ecology) are needed to translate the latest scientific findings into terms that can be understood and applied by the public and decision makers; indicates that the National Center for Atmospheric Research is attempting to do this.

797. **"Plans Announced for Academy for Contemporary Problems",** *Battelle News Release,* **27 April 1971, 3 pp.**

Announces site selection and architectural competition for a joint Battelle Memorial Institute-Ohio State University Academy "to encourage a combination of advanced study, education, and the development of strategies for problem solving on topics relevant to contemporary challenges of man; to promote provocative and mutually beneficial communication of information between members of the Academy and the leadership of the community regarding important public problems; to serve mankind through the application of knowledge and provide advanced training and public service".

798. **"Science and Society Symposium: Prospects for Survival",** *Bulletin of the Atomic Scientists,* **v. 27, no. 5, May 1971, pp. 19-30.**

Consists of edited transcripts of three talks given at the symposium in Chicago last November, speculating on the future of mankind: (1) "The Dodo Didn't Make It: Survival and Betterment", by K. E. Boulding, economist; (2) "The Option for Survival", by R. S. Berry, chemist; and (3) "Survival? Yes. But in What Form", by G. Feinberg, physicist.

799. **Cournand, A. F., and Zuckerman, H. A.,** *The Code of Science: Analysis and Reflections on its Future,* **One of a series of Occasional Papers/1970, The Institute for the Study of Science in Human Affairs, Columbia University, 43 pp.** (Published in *Studium Generale,* v. 23, no. 10, 1950.)

Delves into the culture of science and examines how its interaction with social institutions is creating pressures for changes in the whole system of science.

800. **Basiuk, V., "Perils of the New Technology",** *Foreign Policy,* **no. 2, Spring 1971, pp. 51-68.**

Enumerates main areas of predictable technological "breakthrough" which may profoundly alter our human experience in the next two decades; cites trends which indicate the impact of such profound technological change on the behavior of societies and nations; discusses American scientific and technological policy with regard to Western Europe.

801. **"Technology at a Crossroads",** *Technology Review,* **v. 73, no. 8, June 1971, pp. 72-75.**

Quotes a number of experts who expressed opinions on the future

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of science and technology at a seminar of M.I.T. alumni this spring; discusses the political and economic environments for science and technology and the unemployment "crisis" in physics and engineering; attempts to put America's declining position in international technology in historical perspective; three charts show manpower trends.

802. **Seaborg, G. T., "Science and Technology – The Years Ahead", Remarks presented at the International Science and Engineering Fair Awards Banquet, Kansas City, Mo., May 14, 1971,** ***AEC News Releases,*** **v. 2, no. 20, 19 May 1971, pp. 5-7.**

"Debunks" the myth of a "decline and fall" of science and technology; contends that we are going through a brief period of a shifting of goals and priorities and that in a few years we will see the rise of a better, more purposeful science and technology that will gain widespread appeal and support.

803. **Seaborg, G. T., "Shaping the Future – Through Science and Technology",** ***Edison Electric Institute Bulletin,*** **v. 39, no. 2, March/April 1971, pp. 65-68.**

Explores some of the negative opinions today about science and technology; expresses the belief that science and technology are a part of nature's evolutionary process, that they have contributed to our humanity, are needed to deal constructively with ecological problems, and can be directed to establish a healthy relationship between man and his environment; excerpted from an address before the 1971 Nobel Conference.

804. **Rosen, S., "Science and Technology Approach Year 2000",** ***New Scientist and Science Journal,*** **v. 50, no. 746, 8 April 1971, pp. 76-79.**

Speculates on what will happen to science and technology in the U.S.; discusses how the goals and funds of R&D are distributed between government and industry, how employment patterns of various scientists will change, and how various public constituencies and changing attitudes will affect the directions of science.

805. **Tribus, M., "Technology for Tomorrow vs. Profit for Today",** ***Mechanical Engineering,*** **v. 93, no. 5, May 1971, pp. 16-19.**

The former Assistant Secretary of Commerce for Science and Technology discusses the impact of technology on society and society's attitudes toward technology; suggests giving a Federal tax credit to industries that increase their R&D budgets to a specified percentage of sales to stimulate employment and upgrade industry; recommends reforms to remove existing barriers to the use of technology for the betterment of society.

806. **Goldsmith, M. (Ed.),** ***Technological Innovation and the Economy,*** **A Science of Science Foundation Symposium on Technological Innovation and the Growth of the Economy, held at Churchill College, Cambridge, England, April 11-13, 1969, Wiley-Interscience, London-New York-Sydney-Toronto, 1970, 292 pp. ($9.45).**

Presents the text of the Fifth Annual Lecture of the Science Foundation by R. A. Charpie, followed by symposium papers by authors from the U.S., U.K., Italy, Japan, Germany, France, Canada, and The Netherlands; highlights of discussions following each paper or session are included; indexed by author and subject.

807. **Boulding, K., "The Diminishing Returns of Science",** *New Scientist and Science Journal,* **v. 49, no. 744, 25 March 1971, pp. 682-684.**

Discusses the history of the subculture of science; suggests that in 100 years, the stock of knowledge will be so large that the whole effort of the knowledge industry will have to be devoted to education, which will eventually gobble up all of research and end the growth of science; future interactions between the scientific subculture and other subcultures of society are discussed.

808. **McElroy, W. D., "Youth and Science",** *Congressional Record,* **v. 117, no. 48, 5 April 1971, pp. S4622-4623.**

Expresses his belief that our society cannot survive without science – let alone advance, that the future lies not in deemphasizing science and all rational processes, but in relating science and technology to the needs and activities of society; mentions similarities between the scientific community and members of the younger generation in these remarks at the 30th Annual Science Talent Search Awards Banquet.

809. **"Student Attitudes on Science",** *Bulletin of the Atomic Scientists,* **v. 27, no. 5, May 1971, pp. 31-35.**

Summarizes a *Bulletin* report on findings from interviews of "a dispersed, random sample of 20 undergraduate and 5 graduate students" at six universities across the U.S., regarding attitudes toward the directions of science; covers views on birth control, energy sources, ocean science, budgets, space research, cancer, and basic research.

810. **Chartrand, R. L.,** *Systems Technology Applied to Social and Community Problems,* **Spartan Books, New York, N.Y., 1970, 496 pp. ($12.50).**

Traces legislative efforts, at various levels of government, toward applying innovative technology to nondefense, nonspace problems; examines the use of systems tools in pollution, transportation, housing, law enforcement, education, and health services; extensive bibliography; originally prepared as a Congressional Committee Print, June 1969 [see *SPB,* 2 (3): p. 11].

SPACE – BUDGET

811. **"Authorizing Appropriations to the National Aeronautics and Space Administration",** *Congressional Record,* **v. 117, no. 83, 3 June 1971, pp. H4588-4628.**

Presents the extensive House discussions prior to passing H.R. 7109 (the 1972 NASA Authorization Act) providing specified funding for R&D in each of 12 categories totalling $2.67 billion, for facility construction at various locations totalling $58.63 million, and for research and program management the sum of $706.85 million.

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SPACE – COMMUNICATIONS SATELLITES

812. **"Status Report on NASA International Programs in Space Communications",** ***Congressional Record,*** **v. 117, no. 26, 1 March 1971, pp. E1257-1258.**

    Describes NASA's three major efforts in international cooperative development of space-communications technology: the agreed "Indian-United States Satellite Instructional Television Experiment (SITE)", the proposed "Brazil-United States Educational Television Proposal (SACI)", and the "Proposed Canada-United States Communications Technology Satellite (CTS) Project"; also, mentions briefly the pending NASA-TELESAT (Canada) agreement whereby NASA would launch two satellites for TELESAT on a cost-reimbursable basis.

813. **Smith, D. D., "Educational Satellite Telecommuncation: The Challenge of a New Technology",** ***Bulletin of the Atomic Scientists,*** **v. 27, no. 4, April 1971, pp. 14-18.**

    Describes activities and plans of the Educational Satellite Center (EDSAT) at the University of Wisconsin, which is undertaking "the study of the educational and social applications of satellite telecommunications coupled with the design and development of the necessary hardware systems".

814. **" '70s: Payoff Years From Space; NEO (Near Earth Orbit) Space: The Illiterate Learn to Read and Write",** ***Congressional Record,*** **v. 117, no. 81, 1 June 1971, pp. E5244-5245.** (Reprinted from *Editor and Publisher,* 17 April 1971.)

    A full-page General Electric Co. advertisement summarizes worldwide educational and communication developments due to the use of direct broadcast satellite TV systems; these systems help the earth's standard of living and improve world understanding.

815. **Johnsen, K., "Ambitious Domestic Satcom Urged",** ***Aviation Week & Space Technology,*** **v. 94, no. 17, 26 April 1971, pp. 49-50.**

    Describes a domestic satellite communications system being proposed by Fairchild Hiller; it is aimed at serving the network of American Telephone & Telegraph Company's Bell System; discusses other applicants for system construction permits from the FCC, including Comsat.

816. **Johnsen, K., "U.S., U.K. Fight Over Services Stalls Permanent Intelsat Accord",** ***Aviation Week & Space Technology,*** **v. 94, no. 10, 17 May 1971, p. 19.**

    Presents the British and U.S. positions on the disputed issue of whether the Intelsat global network should be permitted to provide mobile public telecommunications services; mentions other unresolved issues at the third plenipotentiary conference of the 79-nation International Telecommunications Satellite Consortium.

817. **"Communications Satellites: Symphonie and Intelsat",** ***Nature,*** **v. 230, no. 5294, 16 April 1971, p. 422.**

    Announces that the Franco-German Symphonie communications satellite project will be carried through to the construction and launching of two satellites in about two years time; discusses the characteristics of Symphonie and how it may be used.

SPACE – INTERNATIONAL COOPERATION

818. **Percy, C. H., "International Cooperation in Space",** *Congressional Record,* **v. 117, no. 36, 16 March 1971, pp. S3270-3271.**

    Describes the benefits of international cooperative space research programs; reviews agreements between NASA and the Soviet Academy of Sciences and urges continuing efforts along these lines.

819. **Croome, A., "All Up for European Space",** *New Scientist and Science Journal,* **v. 50, no. 746, 8 April 1971, p. 67.**

    Reports briefly on the First European Earth and Planetary Physics Symposium at Reading University and on the activities of ESRO; reports that it has a new Director-General, the German physicist Professor A. Hocker.

820. **"ESRO and ELDO: Point of No Return",** *Nature,* **v. 231, no. 5300, 28 May 1971, pp. 227-228.**

    Reviews the outstanding success of ESRO and the limited achievements of ELDO, which represent the joint European space effort; suggests that the ELDO and Black Arrow projects should both be scrapped and the savings used to participate in the shuttle or some other NASA project; in exchange NASA would provide ESRO with launch facilities, paving the way to complete transatlantic cooperation.

821. **"When Collaboration Can Be Dangerous",** *Nature,* **v. 231, no. 5301, 4 June 1971, pp. 273-274.**

    Discusses causes of the lack of accord among the member countries in the European Space Research and Launcher Development Organizations (ESRO and ELDO) regarding policy and objectives.

SPACE – PROGRAMS AND GOALS

822. **Anders, W. A., "Our Course in Space",** *Congressional Record,* **v. 117, no. 26, 1 March 1971, pp. E1279-1281.**

    Reviews NASA's present and future space activities in the light of President Nixon's six stated objectives for NASA's future activities: moon exploration, planet and universe studies, cost reductions for space operations, extension of capability to live and work in space, expansion of practical applications of space technology, and greater international cooperation; argues for expansion in "the base of support for the program" through selling the merits of a strong national space effort to the public.

823. *Aeronautics and Space Report of the President,* **transmitted to the Congress January 1971, 115 pp.** (Available from the U.S. Government Printing Office, Washington, D.C. 20402. Price: $1.25.)

    Outlines progress toward each of the U.S. space and aeronautics program objectives (Ref. 822), and reviews in detail the activities of the 15 Government bodies directly involved with space and aeronautics activities; six appendixes provide statistical data on spacecraft launches, aeronautical events, and aerospace budgets.

824. **Paine, T. O., "What Lies Ahead in Space?",** *The Futurist,* **v. 5, no. 2, April 1971, pp. 61-64.**

Describes the components of a new space transportation system which must become the key element of our program for the 1970's: the first component is an economical, fully reusable space shuttle; the second, a permanent space station in orbit where men and women from many nations can live and work for extended periods; discusses objectives of our future space program and the possibility of life on other planets.

825. **"Exploring the Universe",** *The Futurist,* **v. 5, no. 2, April 1971, pp. 65-67.**

Presents the view of the men now planning U.S. space exploration; in the future they see a lunar colony with silo-like living quarters for workers, and a series of spacecraft missions including "Grand Tours" which will visit every planet in the solar system and increase man's knowledge of Venus and Mars greatly; space research may also reveal earth's own mineral resources; from a recent NASA report (NASA SP-250).

826. **Hamil, R. E., "Moving Beyond the Earth",** *The Futurist,* **v. 5, no. 2, April 1971, pp. 68-71.**

Reviews recent books and describes new organizations which are attempting to reignite faith in man's destiny among the stars; because earth's problems are basically growth problems, an effort to open up new frontiers in space for eventual colonization is seen as a positive alternative to anarchy or repression; a chart prepared on the basis of forecasts from a variety of sources shows population projections on colonization of space in the 21st century.

827. **Frey, L., Jr., "The United States in Space – the Manned Program",** *Congressional Record,* **v. 117, no. 64, 4 May 1971, pp. H3451-3452.**

Discusses this country's commitment to space – "a commitment leading to a better tomorrow"; gives a history of the manned space program; compares the value of manned space efforts with unmanned space-borne missions; describes the Skylab program, the next manned effort, and future manned flights; gives reasons why we should not stop our work and investment in space.

828. **Frey, L., Jr., "The United States in Space – Applications and Exploration",** *Congressional Record,* **v. 117, no. 66, 6 May 1971, pp. H3590-3592.**

Examines our unmanned satellite program and some of its accomplishments, its present status, and the prospects for the future; covers applications, planetary, and deep space exploration satellites of the NASA program.

829. **Frey, L., Jr., "The United States in Space – Technological Benefits and Achievements",** *Congressional Record,* **v. 117, no. 72, 17 May 1971, pp. H3984-3986.**

Discusses the technological benefits that have come from 12 years of exploring space; in addition to intangible benefits, cites numerous tangible benefits in industrial, medical, and other fields; states there are more than 10,000 identifiable technological spinoffs which the space program has provided so far.

830. **Frey, L., Jr., "The United States in Space – U.S. versus U.S.S.R.", *Congressional Record*, v. 117, no. 75, 20 May 1971, pp. H4152-4154.**

Discusses the military implications of NASA's work and the relationship between the NASA and DOD efforts in space; attempts to compare this relationship with Russian civilian and military programs in space; considers future space activities and the Soviet challenge.

831. **Allen, J. B., "NASA Skylab and Space Shuttle Projects Essential", *Congressional Record*, v. 117, no. 61, 29 April 1971, pp. S5841-5842.**

Reports on recent Soviet spacecraft launchings and states that we have clearcut evidence of Soviet intentions to build a large orbiting space station; expresses concern over our Nation's long-term position in space relative to the Soviet Union and urges that Congress give strong support to the U.S. space program in the next decade, specifically the Skylab and space shuttle projects.

832. **Low, G. M., "Skylab. . .Man's Laboratory in Space", *Astronautics & Aeronautics*, v. 9, no. 6, June 1971, pp. 20-21.**

Describes plans for NASA's "first experimental space station", Skylab, its physical features and its capabilities for helping to solve earth's environmental problems.

833. **Gillette, R., "Space Shuttle: a Giant Step for NASA and the Military?", *Science*, v. 171, no. 3975, 12 March 1971, pp. 991-993.**

Covers the status of plans for NASA's proposed space shuttle; describes the shuttle as it is now envisioned; discusses the demands imposed on the vehicle's performance and obstacles to the project's progress, including cost, possibility of unforeseen technical difficulties, and controversy over its military role – it is expected to replace all of the DOD space launch vehicles by the mid-1980's; names contenders for location of the facilities.

834. **"Space Shuttle Technology", *Washington Science Trends*, v. 26, no. 9, 7 June 1971, p. 50.**

Space Shuttle Technologies, FY 1971 Program (available on request from Code RS, National Aeronautics and Space Administration, Washington, D.C. 20546) contains brief descriptions of 110 projects, their FY '71 funding, and sources of further information.

835. **Proxmire, W., "NASA Should Not Fund the Space Station", *Congressional Record*, v. 117, no. 61, 29 April 1971, pp. S5891-5892.**

Discusses an editorial entitled "Station in Space", reprinted from the *New York Times*, which makes a cogent argument that either there should be no space stations, or they should be under international auspices, in order to limit the possibility that some future space platforms will really be military bases in orbit; benefits and costs are also discussed.

836. **"Rand Report Kindles Space Shuttle Controversy", *Washington Science Trends*, v. 26, no. 9, 7 June 1971, pp. 49-50.**

Discusses the jeopardy of NASA's $12-$14 billion space shuttle (reusable launch vehicle) program on the basis of economics, as brought to focus by the release of Rand's Air Force-financed report, *The Space Shuttle as an Element in the National Space*

Program, RM-6244-1-PR (available at $2.00 from Communications Dept., The Rand Corp., 1700 Main St., Santa Monica, Calif. 90406); brings out military advantages of an operational shuttle and lists current NASA-sponsored activities on the program.

837. **"Space Shuttle: Studies Open Cost-Benefit Conflict",** *Science,* **v. 172, no. 3988, 11 June 1971, p. 1112.**

Airs the opposing views of NASA and the Rand Corp. as to whether or not the proposed space shuttle project is truly an "economical investment".

838. **"NASA in Trouble with Congress, Executive, Scientists",** *Nature,* **v. 231, no. 5302, 11 June 1971, pp. 346-348.**

Analyzes the political repercussions of NASA's recent policy decisions, each of which has managed to antagonize at least one group (Congressional committees, individual Congressmen, Office of Management and Budget, the Space Science Board of the National Academy of Sciences, or aerospace scientists); examples of policies discussed: cutback on Nerva, cancellation of the last two Apollo missions and Saturn V production, retention of the Grand Tour program, and "staking its future on the shuttle".

839. **Kirchner, E., "Sorry, Virginia, There Is No Space Program",** *Innovation,* **no. 20, April 1971, pp. 2, 4-5, 8-9.**

Explains that we have no space program because such a program would have to be built around NASA's plans for manned flight; these plans cannot have the cohesion and consistency of a program when their goals and purposes defy all attempts at precise formulation; discusses NASA's problems.

840. **Lewis, R. S., "Requiem for the Scientist-Astronauts",** *Bulletin of the Atomic Scientists,* **v. 27, no. 5, May 1971, pp. 17-18.**

Editorializes on the fact that the Manned Space Center of Houston considers scientific exploration "as an option" rather than as the major objective of the Apollo space program, and thus selects its crews for their test-pilot backgrounds rather than for their scientific ability; suggests that the disillusionment of scientist-astronauts who have little hope of space-flight assignments is further weakening the already shaky manned space flight prospects.

841. **"Earth Resources Technology Satellite Program",** *Congressional Record,* **v. 117, no. 56, 22 April 1971, pp. S5415-5416.**

Senator Young describes NASA's earth resources technology satellite (ERTS) program and expresses the opinion that it should have the highest priority and the greatest support of all our space projects; includes a recent Department of Interior news release concerning its planned EROS (Earth Resources Observation Systems) data center at Sioux Falls, S. Dak., for the receipt and processing of data from the ERTS program.

842. **Jaffe, L., and Summers, R. A., "The Earth Resources Survey Program Jells",** *Astronautics & Aeronautics,* **v. 9, no. 4, April 1971, pp. 24-40.**

Examines the Earth Resources Survey Program (ERSP) which, in its experimental phase, is gathering "information necessary to national decisions on the advisability of developing operational Earth-survey systems"; describes the use of spacecraft, aircraft, and ground systems, and methods of extracting pertinent information from the data; discusses some characteristics of future survey systems.

843. **Reasoner, W. A., "Space Gains: Putting Technology to Work",** *Congressional Record,* **v. 117, no. 58, 26 April 1971, p. E3490.** (Reprint from April *PSA Flighttime.*)

Describes the benefits gained in space exploration as they relate to the development of better cities on earth; a few of the instruments and techniques used in aerial photography of the earth to divulge land faults, pollution sources, fresh water supplies, and the like are described.

844. *Space-Environmental Vantage Point,* **U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Washington, D.C., 1971, 36 pp.** (Available from U.S. Government Printing Office, Washington, D.C. 20402. Price: 70 cents.)

Describes how earth-orbiting satellites have been, are being, and will be put to work at NOAA's National Environmental Satellite Service for weathermen, oceanographers, fisheries scientists, and humankind; traces the development of environmental satellites; numerous illustrations.

SPAIN

845. **"Spain: Scope for Improvement",** *Nature,* **v. 231, no. 5300, 28 May 1971, pp. 234-235.**

Covers the structure of scientific and technical research in Spain, giving data on the official research centers, research in industry, and university research; discusses bright future prospects; the third development plan (1972 to 1975) should help to link scientific research more strongly to technological development.

STATE SCIENCE ACTIVITIES

846. *Proceedings of the New York State-Federal Science and Technology Conference,* **March 5, 1970, The Rockefeller University, New York, N.Y., 64 pp.** (Available from State of New York, Public Service Commission, 44 Holland Ave., Albany, N.Y. 12208.)

Presents transcripts of papers and discussions emphasizing the state's role in science and technology, with particular reference to New York state; covers such related areas as power needs and programs, health, environment, and Federal-state science relationships.

847. **Underwood, J. E.,** *Science/Technology-Related Activities in the Government of New York State: The Organizational Pattern,* **Office of Science and Technology Report no. 102, February 1971, 112 pp.** (Available from New York State Education Department, Albany, N.Y., 12224.)

Describes in broad outline the way in which the State of New York is organized to carry out certain science/technology-related activities and to obtain science advice; describes organizational innovations; includes bibliographical footnotes.

SWEDEN

848. **Jamison, A., "Swedish Science: Saying What Should be Done",** *Technology Review,* **v. 73, no. 6, April 1971, pp. 12-13.**

    Describes efforts by Swedish scientists to restore polluted, reed-infested lakes; as a result of cutting the reeds, the water level is gradually increased and the lakes will again become wildlife sanctuaries; these lake-restoration projects are good examples of the use of science and scientists to actually effect environmental improvement, rather than just to supply scientific information.

SWITZERLAND

849. **"Switzerland: Searching for a Science Policy",** *Nature,* **v. 231, no. 5300, 28 May 1971, pp. 224-225.**

    Explains why Switzerland has adopted no systematic science policy so far; discusses the Swiss National Fund for scientific research and three main topics which will confront the Swiss Science Council in the future: university policy, research policy, and support of applied research.

TANZANIA

850. **Lamprey, H. F., Kruuk, H., and Norton-Griffiths, M., "Research in the Serengeti",** *Nature,* **v. 230, no. 5295, 23 April 1971, pp. 497-499.**

    Describes new laboratories for Tanzania's Serengeti Research Institute; surveys the scope of its ecological research program: to describe, monitor, and analyze the changes taking place within an ecosystem and to provide background information for the management of the Tanzania National Parks.

TECHNOLOGY ASSESSMENT

851. **Mottur, E. R.,** *Technology Assessment and Citizen Action,* **paper presented in the Professional Seminar Series on Technology Assessment, 26 May 1970, Program of Policy Studies in Science and Technology, The George Washington University, Occasional Paper No. 10, 26 pp.** (Available from National Technical Information Service, Springfield, Va. 22151. Price: $3.00.)

    Outlines a national technology assessment system; proposes the establishment of a Citizens Assessment Administration which would foster and regulate Citizens Assessment Associations; emphasizes the importance of assuring effective citizen action in the assessment process if our society is to survive as a democracy.

852. **Mayo, L. H.,** *Social Impact Analysis: 1970,* **Program of Policy Studies in Science and Technology, The George Washington University, Staff Discussion Paper 210, March 1971, 49 pp.** (Available from National Technical Information Service, Springfield, Va. 22151. Price: $3.00.)

Records some significant events and actions which have contributed to the development of the "evaluative function" in the governmental process; discusses technology assessment, the evaluation of the effects of introducing a technological application into the social environment.

853. **Mayo, L. H.,** *Some Implications of the Technology Assessment Function for the Effective Public Decision-Making Process,* **Occasional Paper No. 12, Program of Policy Studies in Science and Technology, The George Washington University, May 1971, 31 pp.** (Available as Report GWPS-OP 12 from National Technical Information Service, Springfield, Va. 22151. Price: $3.00.)

Concludes that substantial development of data and skill resources is required for the establishment of an adequate Technology Assessment Function; explores the effects of the Technology Assessment Function on various facets of the Public Decision Process.

854. **Tribe, L. H., "Legal Frameworks for the Assessment and Control of Technology",** *Minerva,* **v. 9, no. 2, April 1971, pp. 243-255.**

Examines the proper role of the law in the assessment and control of science and technology so as to generate an environment fit to live in both physically and socially; analyzes three methods of using the law to influence technological development: issuing specific directives, modifying market incentives, and changing decision-making structures.

855. **McElheny, V. K., "Technology: Trying to be Rational",** *Technology Review,* **v. 73, no. 8, June 1971, pp. 12-13.**

Discusses technology assessments, especially in the political arena, and the true purpose of technology; quotes from a speech by Richard L. Garwin of I.B.M. and Columbia University who sees the need for government-funded policy-assessment institutes.

856. **Mottur, E. R.,** *Technology Assessment and Environmental Engineering,* **paper presented at The Eighth Annual Meeting of the Society of Engineering Science, Inc., 11 November 1970, Program of Policy Studies in Science and Technology, The George Washington University, Occasional Paper No. 9, 19 pp.** (Available from National Technical Information Service, Springfield, Va. 22151. Price: $3.00.)

Examines the relationship of environmental engineering to technology assessment and considers how both can contribute to the current conversion of the nation's technical talent and resources from defense- to civilian-oriented programs.

857. **"Commerce Information Service to Offer Environmental Impact Statements of All Agencies",** *U.S. Department of Commerce News,* **no. G71-93, 7 June 1971.**

Announces the availability from the National Technical Information Service, U.S. Dept. of Commerce, Springfield, Va. 22151, of any draft or final environmental impact statement for $3.00 each (paper) or 95 cents each (final statement in microfiche) when ordered separately; NTIS also offers a "package" subscription to all statements in microfiche form for 35 cents each; all statements will be listed in the NTIS semi-monthly Announcement Series No. 68

(Environmental Pollution and Control), which can be ordered for $5.00 annually.

858. **Kiefer, D. M., "The SST vs. Technology Assessment",** *Chemical & Engineering News*, **v. 49, no. 17, 26 April 1971, p. 17.**

Raises questions as to effectiveness of present-day assessment of new technologies; questions whether any system of assessment could have avoided the pro-con SST arguments that seem to be "overstated, irrelevant, or unsupported by firm evidence"; suggests that the issue was really political and "could only be resolved by political means".

859. **Coates, V. T.,** *Technology Assessment of Space Stations,* **Staff Discussion Paper 212, Program of Policy Studies in Science and Technology, The George Washington University, May 1971, 61 pp.** (Available as Report GWPS-SDP 212 from National Technical Information Service, Springfield, Va. 22151. Price: $3.00).

Examines the potential social benefits of earth-orbiting manned space stations, considering such impacts as advancement of scientific knowledge, practical global applications, contributions to national security and international cooperation, medical science benefits, and industrial benefits; concludes that these benefits do not justify giving high priority to space-station development, except under certain conditions.

860. **Tishler, M., "A New Goal for Science",** *Saturday Review,* **5 June 1971, pp. 56-58.**

Uses the examples of the ill-advised replacement of DDT by lethal infectious insect diseases and replacement of detergent phosphates by NTA to illustrate that problem-solving must entail penetrating assessment of the consequences as well as the feasibility of proposed measures; suggests that "the development of new products and manufacturing processes must provide means of preventing the pollution and destruction of natural resources", calling for "more research and technology, not less".

TECHNOLOGY TRANSFER

861. **Heller, T. S., Gilmore, J. S., and Browne, T. D., "Technology Transfer – A Selected Bibliography", Revised Edition, Report NASA CR-1724, Prepared by University of Denver, February 1971, 181 pp.** (Available from National Technical Information Service, Springfield, Va. 22151. Price: $3.00.)

Covers literature on the transfer of science and technology (either in an embodied form or as information only) from one known place to another; includes 564 unannotated references, 65 abstracts of what the authors consider key technology-transfer literature, an author and KWIC (key word in context) index.

862. **Brookner, E., "Applying Technology to Civilian Problems",** *Astronautics & Aeronautics,* **v. 9, no. 3, March 1971, pp. 36-51.**

Reports on a panel discussion held at the AIAA Seventh Annual Meeting; explores how the aerospace industry can survive the reordering of priorities from defense and space work to problems

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of transportation, housing, management, health, crime, and education; includes a discussion of the need for a technology assessment mechanism in Congress by Leo L. Bernanek in which he uses aircraft noise as an example.

863. **Allen, T. J., Piepmeier, J. M., and Cooney, S., "The International Technological Gatekeeper",** *Technology Review,* **v. 73, no. 5, March 1971, pp. 37-44.**

Considers how scientific and technical information flows between countries and how communications channels can be improved; both the literature and direct personal contact are regarded as ineffective information sources; the best performance has been shown by "technological gatekeepers", who are internal consultants serving as intermediaries between individuals and external sources of information.

864. **"Big Business in Technology Licensing",** *Chemical and Engineering News,* **v. 49, no. 9, 1 March 1971, pp. 10-13.**

Reports that moving technology from one man's or one company's shelf to another's production line has become a billion dollar business; licensing efforts are entering a new phase with the development of sophisticated systems of technology transfer and new companies which service the big users of technology in chemical and other industries both in the U.S. and abroad.

865. **Gregory, W. H., "Aerospace's Urban Role Debated",** *Aviation Week & Space Technology,* **v. 94, no. 23, 7 June 1971, pp. 62-64, 66.**

Reports on the Urban Technology Conference, sponsored by the American Institute of Aeronautics and Astronautics, the National League of Cities, the U.S. Conference of Mayors, the International City Management Association, and the city of New York; discusses whether aerospace technology has a role to play in solving various urban problems, with industry skeptical and city government optimistic.

866. **"NASA, City Group Set Target Priorities",** *Aviation Week & Space Technology,* **v. 94, no. 23, 7 June 1971, p. 66.**

Reports that NASA and the 79-city International City Management Association are setting final priorities among 15 selected target problems in their joint Technology Applications Project to improve local government efficiency through fulfilling urban hardware requirements.

867. **Warren, D. S., "Humans vs. Hardware – A Critical Look at Aerospace as an Urban Problem Solver",** *Aviation Week & Space Technology,* **v. 94, no. 23, 7 June 1971, pp. 62-63.**

Discusses what the aerospace industry can contribute to the solution of social problems; lists priorities of what is needed in social development and concludes that none are the forte of aerospace; consists of excerpts from a paper submitted to the Urban Technology Conference.

TRANSPORTATION

868. **Hartke, V., "Transportation in the 1970's: a Decade of Crisis or**

Hope?" *Congressional Record,* **v. 117, no. 82, 2 June 1971, pp. S7950-7951.**

Emphasizes the crucial importance of the ailing American surface transportation system to our economy; describes the type of comprehensive assessment that is needed to avert crisis, and reports that the Subcommittee on Surface Transportation has begun hearings on the railroad industry.

869. **Mines, S., "The Mass Transit Mess",** *Ecology Today,* **v. 1, no. 3, May 1971, pp. 12-13, 44-45.**

Describes the chaotic state of mass transit in several large metropolitan areas of the U.S.; compares American railroads with those of Japan; discusses new technological developments in mass transit, including trains using magnetic repulsion and air-cushion support; states that the need for mass transportation is changing because of the decentralization of industry; describes experiments with fleets of minibuses.

870. **Pikarsky, M., "New Approaches to Urban Mass Transportation Needs",** *Congressional Record,* **v. 117, no. 49, 6 April 1971, pp. E2786-2787.**

Remarks of the Chicago Commissioner of Public Works to a joint American Society of Civil Engineers-Institute for Rapid Transit Specialty Conference; attempts to identify the immediate goals and objectives of urban transportation as derived from the overall societal goals; suggests a checklist of action programs for all phases of urban transportation and explains the need for "Program Monitoring".

871. **Taylor, S. F., "The Rapid Tramway: A Feasible Solution to the Urban Transportation Problem",** *Congressional Record,* **v. 117, no. 38, 18 March 1971, pp. E2042-2046.** (Reprinted from the *Traffic Quarterly* of October 1970.)

Considers the problem of urban transportation in America; discusses the rapid tramway concept which has seen wide adoption in Europe, and compares it with the rapid transit; a table shows European rapid-tramway developments.

872. **Foster, H. E., "A Low, Slow Alternative to the SST",** *Congressional Record,* **v. 117, no. 44, 29 March 1971, p. E2378.** (Reprinted from the *Wall Street Journal* of March 10.)

Makes suggestions as to how the Federal Government can assist in bringing into being a STOL (short take-off and landing) airline network which by performing the short-haul task could do much to restore economic health to the airline industry and supply the missing link in the public transportation complex; advises that stolports should be located in suburbs rather than downtown.

873. **Driscoll, E., "STOL Aircraft for the Late 1970's",** *Science News,* **v. 99, no. 16, 17 April 1971, pp. 269-271.**

Discusses the market for an effective short-distance (up to 500 miles) travel service and the reasons private industry has not capitalized on the need; explains lack of STOL progress and gives details of a proposal for a joint NASA-Department of Transportation venture to develop a STOL system; NASA is requesting $15 million in the 1972 budget for research and development of two experimental short-haul transports.

874. *STOL Aircraft Future Trends,* **May 1971, 49 pp.** (Available from Aerospace Industries Association of America, Inc., 1725 DeSales St., N.W., Washington, D.C. 20036.)

Describes probable trends in Short Takeoff and Landing (STOL) aircraft (size, performance, market, and necessary terminal/ramp characteristics) that have a bearing on airport/STOLport design and operation.

875. *Aviation Industry Working Group,* **Report on Activities 1967 to 1970, 20 pp.** (Available from Aerospace Industries Association of America, Inc., 1725 DeSales St., N.W., Washington, D.C. 20036.)

Describes the formation of the group composed of the Aerospace Industries Association of America (AIA), the Air Transport Association of America (ATA), the Airport Operators Council International (AOCI), and the International Air Transport Association (IATA); outlines its goals, plans, and accomplishments for improvement of the aviation industry.

876. **"Card: Aviation R&D Goals",** *Astronautics & Aeronautics,* **v. 9, no. 6, June 1971, pp. 12-13.**

Reviews a report by the joint Department of Transportation (DOT)/National Aeronautics and Space Administration (NASA) Civil Aviation Research and Development (CARD) Policy Study; the study gives top priority to R&D on aircraft noise abatement and the congestion of traffic in and around airports; makes numerous other recommendations related to aeronautical R&D.

877. **Holder, C., "Academy Panel Kicks Over Traces",** *Congressional Record,* **v. 117, no. 66, 6 May 1971, p. E4053.**

Praises a report from the National Academy of Sciences-National Academy of Engineering which deals with the consequences of extending new runways for John F. Kennedy Airport into Jamaica Bay; it concludes they would cause major irreversible ecological damage; the report, which aspires to be a national guide for airport planning and economy, was commissioned by the Port of New York Authority.

UNITED KINGDOM

878. **Sherwood, M., "Science and the Politician",** *New Scientist and Science Journal,* **v. 50, no. 751, 13 May 1971, pp. 402-403.**

Airey Neave, Member of Parliament for the Abingdon Division of Berkshire (a constituency which probably has a higher density of scientists in it than any other) and chairman of the Select Committee on Science and Technology, discusses his views on the committee's work and on the role of the scientist today.

879. **Valéry, N., "Contract Research Comes in from the Cold",** *New Scientist and Science Journal,* **v. 50, no. 748, 22 April 1971, pp. 198-199.**

Reports that the general tightening of money for research in Britain has helped create growth conditions for the contract research laboratories; eight independent laboratories have sprung up and experienced an annual growth of 10% over the past 5 years – 70% of their work is derived from industrial sources; also discusses recent experiences in the U.S. which suggest guidelines along which contract research in Britain might develop.

880. **Carter, R., "Big Technology and the Late Lamented Mintech",** ***New Scientist and Science Journal,*** **v. 50, no. 748, 22 April 1971, pp. 196-198.**

Carter, a British MP, reviews the accomplishments as well as the mistakes of Mintech, the now abandoned Ministry of Technology; suggests that Britain's greatest problem has long been the need to introduce into industry the technological developments arising from scientific research, and not the need to devote more resources to science.

881. **"Select Committee: Means to an End",** ***Nature,*** **v. 231, no. 5300, 28 May 1971, p. 208.**

Reports on an account of services to British industry and technology as presented by the Department of Trade and Industry recently to the House of Commons' Select Committee on Science and Technology; discusses major items of expenditure and how DTI is forming policy; includes a table of R&D expenditures by various U.K. bodies for 1970-71.

882. **Caplan, B., "Knowhow: an Adverse Balance for Britain",** ***New Scientist and Science Journal,*** **v. 50, no. 750, 6 May 1971, pp. 326-327.**

Questions whether Britain is missing out in one of the fastest growing industries of the seventies, which is the buying and selling of technological knowhow; Britain's rate of growth in the knowhow business has been slower than any other of the major industrialized countries; a chart shows purchase and sales from 1964-69.

883. **"Cooperative Research in Trouble",** ***Nature,*** **v. 231, no. 5300, 28 May 1971, pp. 206-207.**

Describes the British industrial research associations which date back to the twenties and which, because of new policies of the Department of Trade and Industry, seem to be near their end; states that, in principle, the U.K. government appears to be committed to a reduction of direct support for industrial research and also a reduction of its own intramural applied research.

884. **Macleod, R. M., "The Support of Victorian Science: The Endowment of Research Movement in Great Britain, 1868-1900",** ***Minerva,*** **v. 9, no. 2, April 1971, pp. 197-230.**

Examines thoroughly the history of the political, philosophical, and social conditions in Britain which resulted in the endowment of scientific research – a process that occurred in five distinct phases between 1850 and 1900.

885. **"Population: Crying Halt in Britain",** ***Nature,*** **v. 231, no. 5299, 21 May 1971, p. 140.**

Discusses a report of the House of Commons Select Committee on Science and Technology (HMSO, £2.40) which states that there is likely to be "a substantial and continuing increase in population" between now and the end of the century; the committee proposed that the government set up a special office to formulate policy on the British population.

886. **Delacourt-Smith, Lord, "Wanted: A Telecommunications Policy",** *New Scientist and Science Journal,* **v. 50, no. 747, 15 April 1971, pp. 160-161.**

Describes the adverse effects of the U.K.'s failure to adopt "an openly discussed and broadly conceived telecommunications policy" on England's telecommunications equipment industry; calls attention to the "enormous capital programme" (around £500 million a year) being undertaken by the Post Office to improve the U.K.'s chances of capturing a larger share of the growing world market for telecommunications equipment.

887. **"Suspended Animation in Atomic Energy",** *Nature,* **v. 230, no. 5295, 23 April 1971, pp. 481-482.**

Discusses the effect of the United Kingdom Atomic Energy Authority's discontinuing the manufacture, sale, and reprocessing of nuclear fuels and sale of radioisotopes; questions are raised concerning the fate of the existing government atomic energy laboratories.

888. **"Pollution: Councils Co-operate",** *Nature,* **v. 230, no. 5291, 26 March 1971, pp. 200-201.**

Discusses a report by an inter-council working party which recommends that there must be far more cooperation between the British research councils and increased support for fundamental research, if problems of pollution are to be tackled efficiently; includes a table which shows estimated direct expenditure on major types of pollutants for each of the five councils.

889. **Tinker, J., "Environmental Politician",** *New Scientist and Science Journal,* **v. 50, no. 748, 22 April 1971, pp. 214-216.**

An interview with Peter Walker, Britain's Secretary of State for the Environment; comparing his own environmental machine with the U.S. Council on Environmental Quality, he states that his system is much better and that the U.S. will try to copy it; he has advantages in the detailed program of legislative and administrative measures which the Labor Party initiated and in the quality of his scientific and administrative advice.

890. **Coleman, H. J., "Concorde, RB.211 Spark U.K. R&D Crisis",** *Aviation Week & Space Technology,* **v. 94, no. 22, 31 May 1971, pp. 67-68.**

Discusses problems facing the British aerospace industry, which is approaching a research and development crisis that is a direct result of heavy spending on the Concorde supersonic transport and the Rolls-Royce RB.211 advanced technology engine; examines government policy as it relates to the development of V/STOL aircraft in Europe; includes illustrations of two aircraft designs.

891. **"Black Arrow Inadequate",** *Nature,* **v. 230, no. 5292, 2 April 1971, p. 269.**

Questions the wisdom of Britain's planned Black Arrow launch vehicle program, which appears to be inadequate to develop the required satellite capability to enable British electronics companies to become competitive in the highly profitable communications market; alternatives to the project are discussed.

URBAN PROBLEMS

892. **"Translating Technology into Municipal Hardware and Improved Productivity",** ***Nation's Cities,*** **v. 9, no. 6, June 1971, pp. 16-20.**

  Reviews recommendations from two conferences: The Application of Science and Technology to Local Government, and How to Acquire New Systems and Products; discusses the problems of bringing together local government and industrial leaders to solve urban problems and the ability of "defense and space technology methods to solve urban problems".

U.S. SCIENCE POLICY

893. **Price, D. K., "Science at a Policy Crossroads",** ***Technology Review,*** **v. 73, no. 6, April 1971, pp. 31-37.**

  States that there has been an intellectual revolution which has led conservatives and radicals alike to question the assumptions on which our science policy was founded after World War II; discusses three aspects of our recent science policy: the relation of science to technology, education, and politics; concludes that we may be at a turning point in science policy and the route we take will need to be corrected year after year.

894. **"Counterbudget: A Blueprint for Changing National Priorities 1971-76 as Proposed by the National Urban Coalition",** ***Congressional Record,*** **v. 117, no. 76, 21 May 1971, pp. E4836-4898.**

  Consists of 25 chapters containing specific proposals for the sound expenditures of Federal funds in different areas; "constitutes a broad statement of public needs in America and recommendations for meeting those needs"; some of the areas covered are employment and manpower, health, education, metropolitan development, transportation, environment, population, rural development, R&D (see Ref. 760), national defense, law enforcement, and foreign aid.

895. **"New Directions in Nation's Science Policies – Address by Dr. William McElroy",** ***Congressional Record,*** **v. 117, no. 66, 6 May 1971, p. S6349.**

  Discusses the budget and program of the National Science Foundation; although it is strengthening its commitment to basic research, there is a new emphasis on "Research Applied to National Needs" or RANN; predicts that budgets for science concentrated on societal problems will increase rapidly in the future; excerpts from remarks to the annual meeting of the Biophysical Society.

896. **"New Brooms Begin to Sweep",** ***Nature,*** **v. 230, no. 5293, 9 April 1971, pp. 348-349.**

  Discusses the latest Administration attitudes toward science and scientific institutions as reflected in the growth of the National

Science Foundation's budget, elimination of graduate-student traineeships, and emphasis on applications of science and technology to practical problems (e.g., NSF's program on Research Applied to National Needs – RANN).

897. **Cahn, V., "Dark Clouds with a Silver Lining"**, *Technology Review*, v. 73, no. 5, March 1971, pp. 10-11.

"After a few years of lower budgets and higher costs, there is evidence to suggest that economic and political factors may join to yield a new level of federal support for research and development by 1972"; includes discussion by Dr. Edward David, Jr., the President's Science Adviser, Dr. Philip Handler, President of the National Academy of Sciences, and Dr. William F. McElroy, director of NSF, on science policy issues.

U.S.S.R.

898. **"Soviet Research: Where to Push Next"**, *Nature*, v. 231, no. 5298, 14 May 1971, p. 72.

Reports that a speech of Academician Mstyslav V. Keldysh gives indications of which research projects will bear greatest emphasis within the context of the current five-year plan; special emphasis will be placed on cybernetics and all its ramifications, research in physics is to be emphasized, and the need for more "rational" use of natural resources will be stressed.

899. **Dornberg, J., "Russia's Technological Gap Widening"**, *Congressional Record*, v. 117, no. 34, 11 March 1971, pp. E1813-1814. (Reprinted from the *San Francisco Examiner*.)

Blames the lag in Soviet technological progress on the obsession of the political system with secrecy to conceal military developments from foreigners, so that developments that benefit military or space programs are seldom reapplied to domestic industry.

900. **Winston, D. C., "Soviets Sustain Military Research Growth"**, *Aviation Week & Space Technology*, v. 94, no. 15, 12 April 1971, p. 23.

Discusses Soviet research funding which, according to John S. Foster, Defense Dept. director of research and engineering, has been allocated wholly to military research and development since 1968; gives statistics which show that the Russians will be devoting 40 to 50% more equivalent effort to military R&D during Fiscal 1972 than will the U.S.; makes predictions and offers a solution.

901. **"USSR: The Soviet Challenge"**, *Science Policy News*, v. 2, no. 5, March 1971, p. 62.

Presents a review, originally published in Russia by V. P. Elyutin, Soviet Minister for higher and intermediate specialist training, summarizing the state of Russia's advanced education studies; the USSR has 4.6 million students at 50 universities and 800 advanced institutes; brief facts and figures are included for teacher training, engineering, agriculture, medicine, problem-oriented research, television courses, and student selection.

902. **Petrosyants, A. M., "Nuclear Power in the Seventies"** (in Italian), *Notiziario Comitato Nazionale Energia Nucleare*, v. 16, no. 6, June

1970, pp. 53-62.

The Chairman of the Soviet State Committee on Nuclear Energy discusses the prospects of development of nuclear power in the next decade; emphasizes Soviet activities in the area of nuclear power plants, the experiments carried out with the 70-GeV Serpukov proton synchrotron, and the present status and prospects of controlled nuclear fusion.

903. **"Soviet Resources: Water in Wrong Places",** *Nature*, **v. 231, no. 5299, 21 May 1971, p. 140.**

Reports that water resources in the Soviet Union are once again the subject of considerable concern in the Russian press; discusses the demand for water, the fact that the reserves are not well distributed in relation to the population, and plans for increasing the water supplies.

904. **Shepherd, E. C., "Soviet Supersonic Leap",** *New Scientist and Science Journal*, **v. 50, no. 748, 22 April 1971, pp. 189-190.**

Announces that the Russians are making plans to put their supersonic airliner, the TU 144, into service within their own borders this fall and to start it working on international routes next year; since the USSR has declined to authorize the visits of inspection upon which airworthiness certificates depend, the airliners cannot be used for public transport by Western countries.

905. **Petrov, B., "Targets for Soviet Space Research",** *New Scientist and Science Journal*, **v. 50, no. 750, 6 May 1971, pp. 308-310.**

A USSR Academician discusses the goals of the Soviet space program; the chief arena for manned flights is the near-Earth space environment, including manned spacecraft, systems intended for scientific studies, transport vehicles, and long-lasting orbiting stations; automatic systems will be improved to study the Moon, outer space, and the planets; considers the laser to have tremendous potential in space research.

906. **Gatland, K., "Russian Space Programme Plods Ahead",** *New Scientist and Science Journal*, **v. 50, no. 749, 29 April 1971, pp. 256-257.**

Covers the long-term space plans of the Soviet Union, including the Cosmos and Soyuz programs which are part of the gradual buildup to space station activity; discusses Russia's aim in placing the Earth under detailed observation with multispectral cameras and other sensing equipment; lists 14 main areas of interest suggested by analysis of recent Soviet pronouncements on space stations.

907. **Spivak, J., "Russia Quietly Pushes Its Space Technology, Threatens U.S. Lead",** *Congressional Record*, **v. 117, no. 32, 10 March 1971, pp. E 1697-1698.** (Reprinted from the *Wall Street Journal*, 10 March 1971.)

Compares U.S. and U.S.S.R. space programs as to objectives, accomplishments, and levels of effort; discusses characteristics of the Russian Soyuz spaceships, military implications, future plans, and Soviet-U.S. cooperation in space.

WEST GERMANY

908. **Walters, N., "Germany's Science Boom Gets Underway",** *New Scientist*

and Science Journal, v. 50, no. 752, 20 May 1971, pp. 471-472.

Covers some impressive advances which have been made in science and education in West Germany, in spite of inflation; discusses future budget plans and the support given to various research programs, including nuclear energy, computer technology, and the fastest growing new technologies: high-speed ground transport, environmental engineering, and biomedical technology.

909. **"Volkswagen Foundation Concentrates on Educational Research", *Science Policy News*, v. 2, no. 5, March 1971, p. 54.**

Discusses recent activities of the Foundation in the promotion of research in Germany through fellowships and research assignments; currently, educational research and methods of teaching science and mathematics are displacing biology for primary attention; problems of coordination with other institutions and continuing support for individual projects are mentioned.

910. **"German Talent Drain Easing", *Science*, v. 171, no. 3975, 12 March 1971, p. 988.**

Points out that cutbacks in U.S. R&D spending and increasing employment opportunities in West Germany have caused a sharp reduction in the emigration of scientists from West Germany to the U.S., and many are returning home.

911. **"Society for Peace and Conflict Research", *Science Policy News*, v. 2, no. 5, March 1971, p. 54.**

Announces the formation of the Society in October 1970 to: "promote peace and conflict research, help to propagate peace concepts, and coordinate other appropriate research assignments"; membership is institutional (Federal and Länder governments, unions, and religious groups); funded through the Federal Ministry of Education and Science; presents highlights of inaugural speech by Society president Gustav Heinemann.

912. **"V/STOL Technology Exploitation Principle Gets German Backing", *Aviation Week & Space Technology*, v. 94, no. 17, 26 April 1971, p. 32.**

Reports that the West German government backs in principle the exploitation of V/STOL technology, but the industry will not be able to develop the hardware immediately; discusses the stage of development of an operational V/STOL and includes conclusions of a study group headed by Karl Thalau whose purpose is to evaluate competitive designs.

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913. **Major, R. L., "Marine Biology and the Marine Biologist in Yugoslavia", *BioScience*, v. 21, no. 6, 15 March 1971, pp. 263-265.**

Describes the marine biological stations in Yugoslavia, outlines the research programs, and discusses the status of the marine biologist in Yugoslavia; the author was at the Institute for Oceanography and Fisheries in Split, Yugoslavia, from February through August 1969 on an exchange visit; includes 4 illustrations and a table showing specialties and locations of scientists.

PUBLICATIONS REGULARLY SCREENED FOR THE REVIEWS

Advancement of Science
AEC News Releases
American Behavioral Scientist
American Scientist
Astronautics and Aeronautics
Aviation Week & Space Technology
BioScience
Bulletin of the Atomic Scientists
Chemical and Engineering News
Congressional Record
Engineering News Record
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Fortune
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